



THE CHOICE OF PROPER  
FILLING MATERIAL  
by  
J. FOSTER FLAGG, D.D.S.  
1900

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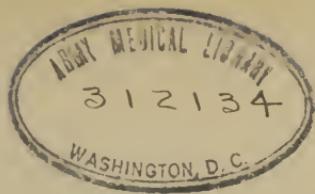
as a token of kind  
remembrance, from

J. Foster Flagg -

1902

From "All Gold"

to "All Gutta-percha" -



# The Choice of Proper Filling Material

BY J. FOSTER FLAGG, D.D.S., SWARTHMORE, PA.

111

June, 1899.

“Failure in operations is mainly due to incompatibility of filling material with toothbone.”

Fellow members of the California State Dental Association.  
Greeting –

The text which I have chosen as the theme upon which to talk to you at this time is the *germ* of that egg which, when hatched, developed into what came to be known as “*The New Departure*.”

Without touching at all upon the other points at issue between the “creed” of that movement and what was known as the “accepted creed” of twenty years ago, and which is *yet* largely—though not so largely—“accepted” as basal rules for dental practice, I wish to ask your special consideration of this, the *third article* of the “New Departure Creed.”

It cannot be denied that for a very long time—at least forty or fifty years—a tendency to “recurrence of decay” around fillings has been noticed, thought upon, written about and discussed; and that this tendency, as especially illustrated by the disintegration of tooth substance around gold fillings, and yet again as, probably, most noticed from frequent “recurrence of decay” at the cervical margins of cavities, gave to dentistry, at a time beyond the recollection of almost everyone now practicing, the term “cervical decay” with its universally received *explanation* of “defective manipulation.”

That this idea is yet strongly retained is seen by reference to page 217 of “The American Text Book of Operative Dentistry,” where is found “defects which arise from subsequent caries are perhaps more frequent in approximal surfaces at or near the cervical margin. These borders are vulnerable points for the recurrence of caries, and *imperfect adaptation is not in-*

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frequently the determining cause of the beginning of such decay." (the italics are mine)

"Not infrequently" is synonymous with *sometimes*, or it may even be regarded as *almost frequently!* but what are *some other causes* for this undesirable result? and how is it that "not infrequently" this imperfect adaptation is permitted to exist?

But the three paragraphs following are those to which my text directs special attention.

First, "repair" of such imperfect fillings is taught to be made with gold, and such teaching is concluded in the beginning of the third paragraph in these words "Such repairs are often required in the bicuspids and molars, and large fillings otherwise good are saved by a successful repair at the cervix." (italics are mine, for the purpose of accentuating the points I desire particularly to impress by this paper.)

Now I would ask if "imperfect adaptation" not infrequently results from a first effort under former conditions, what inducement is offered for another trial of the same kind under conditions of increased inaccessibility and consequent greater difficulty? and, more than this, if this "subsequent caries" has developed in, say, from three to five years (and such cases are very frequent) what incentive exists for *such* further effort?

But as we read on we find that "The plastics are sometimes" (note this word) "indicated in this class of cases, provided they be not so near the anterior part of the mouth as to be unsightly" and then Gutta Percha is said to often serve a good purpose but "is less reliable than gold." And continuing with the "oxyphosphates" these are "contraindicated because of their liability to wash away after a few months."

At last we come to amalgam, in connection with which I naturally feel a close interest, as *I first suggested*, its use not only for these cervical repairs but for "guards" (as I termed them) to prevent, for the greatest possible length of time this "recurrence of caries" at the cervical margins of gold fillings - This "guarding" (which I wish you to note is practice *distinctly in advance* of "repairing") I have been

doing for over 30 years (since 1865) and this "repairing" for more than 40 years (since 1857) and it is this *constant* utilization of this material for all this time, and its use in recurrent caries of the soft and softest teeth, exclusively, for more than twenty years, during which time I operated upon no teeth above medium in structure, that makes the word "sometimes," quoted above, sound to me peculiarly inappropriate.

The teaching of this "Text Book" given in the next ten lines is a fair illustration of the Plastic question from the view of one of the best gold workers that ever handled a plugger.

These ten lines begin "amalgams are more frequently used, and nearly always serve well when thus employed; but unfortunately the contact with gold insures discoloration, and an unsightly filling is the result."

Again the word "unfortunately" sounds strangely to Plastic workers, for this *fortunate* discoloration is the result upon which we base our hope for the long continued exemption from recurring caries. No true utilizer of amalgam for this purpose would think of using an amalgam which would best maintain a good color but, on the contrary, "*in proportion as the tooth NEEDED saving*" would select that alloy from which he would most surely make a discolored amalgam—and if the cavity of repair was not entirely above the free edge of the gum, he would drill out the discolored amalgam in such wise as that a continuation of the gold could be made in the portion exposed to view.

The next statement also, from the "Choice of Filling Material" standpoint, does not appeal to the Plastic filler, for it is stated that "The discoloration of the surface of the alloy" (meaning amalgam) "does not lessen its value as a preserver of the tooth, but its unsightliness is often too great to be tolerated; nevertheless, utility enters so largely into the equation that the operator feels justified in using the alloy" (amalgam) "because with it he feels sure of making a better repair."

Our glorious old "Patriarch" Atkinson used to tell us "not infrequently" that "half a truth was worse than a whole lie"

and it seems to me that a half century of experience has taught us, beyond a peradventure, that to say no more for the sulphiding of amalgam than that it "does not lessen its value" puts the statement in the category of a "half truth," for no other reason has ever been given for the marvelous tooth saving ability of coin amalgam other than that it turns "as black as one's hat."

But it is the last few words of our quotation "because with it he feels sure of making a better repair" which is my warrant for sending you this paper, for the two fold purpose of assuring you of my continued loyalty and affection for our beloved California, and to prepare the way for a future communication to our "Pacific Coast Dental Gazette" upon the "Consonance of Potential" and the Specified using of given filling materials for the "compatible" filling of teeth of varied given structure.

# THE CHOICE OF PROPER FILLING MATERIAL.

BY J. FOSTER FLAGG, D. D. S., SWARTHMORE, PA.

## THIRD ARTICLE OF THE NEW DEPARTURE CREED.

"Failure in operations is mainly due to incompatibility of filling material with toothbone."—*S. B. Palmer, M. D. S.*

"Because with it he feels sure of making a better repair."

—*American Text-Book of Operative Dentistry*, p. 217, line 35.

### [PART FIRST.]

IT is now forty-two years since I began my systematic work as to the results of the utilization of different filling materials in the filling of cavities of dental decay, together with the tabulation of such results in order that statistics might give value to the record.

To the fact that I was a competent gold-worker I think no one conversant with my work will offer denial, while hundreds of fillings which have now done from twenty-five to more than forty years of service, and are yet in perfect condition, will render any needed corroborative testimony.

Had I not felt my own ability in this regard, I could never have successfully maintained the position I have taken in the *teaching* of this "Third Article of the New Departure Creed."

In the early days of the New Departure struggle, when occasional question was made as to my gold work, I always met the insinuation by promptly offering to fill with gold, against the gentlemen, all kinds of teeth, and with cavities in every position—and I may *now* say that such offer was never accepted.

I felt sure of *equal* success, and, in the majority of instances, of decided triumph, as I was a *soft* gold worker even in the large "contouring" of cuspids, bicuspids and molars, or in the "edge building" of incisors, and my soft gold and hand pressure operations were largely to be made against cohesive gold and malleting, *therefore*, I felt confident.

Upon my return from California in 1855, I found both gutta-percha (Hill's stopping) and amalgam (Townsend's), added to the *accepted* list of filling materials, which at the time of my leaving for California in 1849 consisted, practically, of gold

and tin foils, there having been an equally practical abandonment of lead, fusible metals and amalgam.

The results of my father's experience with the two newly accepted filling materials, together with the enthusiasm of the friend of both my young and more mature years, Prof. Elisha Townseid (see *Plastics*, p. 34), soon engendered the desire to experiment with them for myself, and now, after more than forty years of that successful utilization of them, for which I am supremely grateful, I look back upon my life work as associated with dentistry as something eminently satisfactory to my patients, my students and myself.

It has been my privilege to discuss so extendedly, before classes, the matters of which I propose now to write, that to my Pacific Coast students these articles may seem like old-time talks, but the vital importance of the subject and the advantage of its concise, systematic and minute presentation will, I hope, be recognized and prove both acceptable and profitable.

Again, much of which I must write will seem to me merely reiteration, for it has been so many years since discussions, magazine articles, society papers and deliberate publications have pointed both generally and specifically in the direction of "choice of filling material," that I repeat because *even now* the need for this is *positively denied*, while twenty years ago, and as the result of a carefully tabulated experience of twenty years before that, I wrote that even then we had the "tests" for this choosing, saying: "*By means of these tests we are enabled to make a CHOICE OF MATERIAL to meet the varied indications that constantly present in practice, which, to our apprehension, approaches to SOMETHING LIKE SCIENCE.*"

And more than this, it is also twenty years since I was able to say to the American Dental Association this utilization of specially chosen materials enabled those who had adopted it to then "*take any denture so forlorn as to be HOPELESSLY abandoned by the BEST GOLD OPERATOR in the world, and make of it a COMFORTABLE, SATISFACTORY and BEAUTIFUL success.*"

And has the twenty years of added experience since then given any cause for the least change in these enunciations?—Most emphatically I answer, No.

And so it is that *now*, as *then*, a combination of "two, three,

four or more different materials is made in the filling of one cavity, each of which best subserves its purpose in its appropriate position, and insures an operation which for comfort, beauty and permanency can *in no other way* be equaled."

That this may be done requires the most complete knowledge possible of all the attributes of the varied "filling materials" now used by dentistry, together with a like knowledge of all the "adjunctives" which are ever assigned a place within a cavity of decay as a component of the filling.

Those of these which can be classed as "filling materials" are *Gold*, in its various forms; *Tin*, usually as foil; *Amalgam*, of the three varieties, Sub-marine or Discoloring; Contour or Usual, for ordinary work; and Facing or White, where maintenance of color is specially desirable; *Gutta-percha Stopping*—White or Shaded, Yellow, or Grey, and of High, Medium, or Low Heat; *Pink Gutta-percha Base-plate*, for occasionally desirable use; and *Porcelain* in its properly styled "art work."

The reason why these alone can be ranked as "filling materials" is because we know sufficiently their capabilities for *resisting outside influences* to be able to prognose, with much certainty, their probable rendering of service, while with the "adjunctives" we either do not utilize them for external position, or, if for any reason this is sometimes done, it is absolutely impossible to prognose anything regarding the future of the work.

Of these we have *Oxy-chloride of Zinc*, with its usual rapid disintegration and its occasional marvelous endurance as an outside material; *Zinc-phosphate*, the powder of which is an accurately nitrated oxide of zinc; *Oxy-phosphate*, the powder of which is calcined or, so-called, vitrified, oxide of zinc; *Zinc-sulphate*, specially useful as a pulp-capper; *Temporary Stopping*, of great value as an "intermediate" from its non-leakage, its impermeability and its adhesive plasticity at comparatively low temperature; and *Rubber Varnish*, unique in its value both as a "liner," an "intermediate" and protector of soluble fillings from the *immediate* action of the fluids of the mouth.

It is with these, then, that we will have to do, directly and incidentally, in the discussion of "the choice of proper filling material."

## [PART SECOND.]

IN the treatment of any subject it is often of as much importance to decide the points proper to disregard as to establish those which, in different degree, claim more or less attention until we reach that imperative which demands the most positive recognition and the greatest amount of knowledge, experience and skill for the accomplishment of the best result.

It is therefore with the *size* of a cavity that we have first to do as regards the *principles* which underlie the choice of filling material.

*SIZE of cavity has NOTHING to do with it.*

That this should be made clearly manifest is needed because it is such ancient and is, even yet, such almost universal belief, that *small* cavities should, as a matter of course, be filled with gold, and that it is an equally frequent deduction that some cavities are *too large* for that filling material and, because of their size, some other material is indicated, and further, that the *limit of size* for the one filling material or the other is too undecided for the practice of scientific dentistry.

And yet, the fallacy of the idea that *size* had anything to do with the choice of filling material suggested itself to the dental mind fully fifty years ago and in no indefinite manner.

When, after what he thought sufficient experimentation with his gutta-percha stopping Dr. Hill concluded to offer it as a filling material, he said that while he had no idea that it would supercede gold he nevertheless believed it could be advantageously used, instead of gold, in many cavities.

Together with this hinting that gold had not, at that comparatively early date, proven to be all that could be desired, it was suggested that the color of Hill's Stopping was a desirable attribute in certain cavities in front teeth in connection with which a considerable degree of freedom from attrition would add much to the duration and consequent value of the filling.

There was no mention made as to the *size* of such cavities, but in the later 50's it had been noticed that the smaller the cavities the lesser the loss of the Hill's Stopping from attrition, which result was recognized then, as now, to be its vulnerable attribute.

In contradistinction to these *small* cavities it was soon found of exceeding value on what were then regarded as *enormous* cavities in the buccal faces of lower molars, and especially in cases where by repeated failure of gold fillings the cavities had increased in *size* until, as it was said, "they were rather too large to be filled with gold on the score of expense."

So it was that, as Dr. Hill had said, "in many cavities," *small and large alike*, a choice of filling material seemed desirable, and thus the idea grew that the *size* of the cavity was not only *not* a controlling factor in the making of this choice, but that it had *little* to do with it; and then as both *small* fillings and *large* fillings of *both* gold and gutta-percha had been proven to be eminently serviceable under certain circumstances it finally began to dawn upon dentistry that this "little" amounted practically to *nothing*.

It was at this time that amalgam again came to the front, and under such respectable auspices as to warrant its immediate and enthusiastic reception.

This material, easy to prepare, easy to introduce, easy to smooth and finish, and absolutely resistant to attrition and the fluids of the mouth, being recommended by one whose official position was that of President of the American Society of Dental Surgeons, and who was known as a "most earnest and indefatigable worker," it is not strange that its use was not then regarded as confined to "lazy men" and "quacks."

But again it was demonstrated most markedly that the association of *size* of cavity and choice of filling material was dominant in the dental mind, for, while amalgam was freely accepted as the "Succedaneum" for gutta-percha stopping it was, by no means, accepted as such for gold in any other than *large* cavities, *except by very few*.

These were those who had already noted the decided increase in length of service given by "Hill's Stopping" as contrasted with gold in certain kinds of teeth which in those days were said to be "prone to decay."

In these, then, certain men who, as experience has proven, were in advance of their fellow practitioners, substituted amalgam for gutta-percha in the *small* cavities in which the latter had been found to do service until by attrition and the action of the fluids of the mouth *it* had been worn out.

That this is so is definitely proven by an extract from the speech I made before the New York Odontological Society, November 20th, 1877, (note, if you please, that this was twenty-two years ago!) relating to *small cavity* work and to the sarcastic remark regarding "the pin-head cavities in centrals filled with amalgam by Dr. Clowes" following this reference by an assertion, based upon an experience *then*, of more than fifteen years of carefully tabulated results, that I "would rather have one of Dr. Clowes' 'pin-head' amalgam fillings in one of my centrals" than to have such fillings as it had been demonstrated would permit repeated recurrence of decay.

But leaving the matter of *size* of cavity out of the question it was soon found that amalgam, though quite sufficiently proven to be a valuable "succedaneum" in such cases, was undesirable in view of its practically universal discoloration of the surrounding structure of such "prone to decay" teeth, and it was this result which soon led me to the experimental "lining" of cavities in the early 60's with the then new "Sorel's Cement," the first of all the "Oxy-chlorides."

Although *large* cavities in molars and, even more, in bicuspids were thus filled and, as was promptly shown, most advantageously, this new device was immediately utilized in the *small* cavities as well as the larger ones in incisors and cuspids, thus continuing the elimination of *size* as a factor in the choice of material for the filling of cavities from dental decay.

*SIZE of cavity has NOTHING to do with it.*

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[PART THIRD.]

THE second proposition in the study of the choice of proper filling material is, that THE ACCESSIBILITY OR RELATIVE INACCESSIBILITY of the cavity has SOMETHING to do with it.

So many considerations are important to the *full* appreciation of this proposition that a complete discussion of our subject is essential to it, nevertheless so much may now be said upon it that can be utilized, and so comparatively unimportant to the *final accurate* selection of filling material is this "accessibility or relative inaccessibility of the cavity" that its discussion in this, its proper place, is desirable.

It will be recognized *first*, that the manipulative attributes

of the various filling materials proper, as well as of the adjunctives when these, for any reason, are to be tested as fillings in special cases, are as widely different as is the manipulative ability of those who propose using them, and, as the proper recognition of our second proposition depends upon both an exhaustive knowledge of these attributes under all circumstances, and that just appreciation of one's own manipulative ability, which is to be gained only by long-continued observant experience, it will be seen that the *something* which the accessibility or relative inaccessibility of the cavity has to do with the choice of filling material is not the simple factor to determine which it might at first seem to be, but that it is, perhaps more than any other, that one which depends upon the individuality of the operator.

Thus it is that in a case in which gold would be "the proper filling material," an operator might decide that "under the circumstances" amalgam would be the material to use; while, on the other hand, in a case in which amalgam would be *decidedly* "the proper filling material," the knowledge that *he* could introduce a *good gold filling* into that cavity might decide him to use that material.

In neither case would the proper material be used, but in neither case would it be recognized by the operator that this was so, while again "all round excellence" would feel competent to use gold properly, and thus to the best interest of his patient, *even* "under the circumstances" in the first instance, and as well, it would use amalgam in the second instance not because of the difficulty of the introduction of the gold, but because of its knowledge of other considerations which made amalgam the "choice for a proper filling material."

And thus it is, again, that while the discussion of this second proposition brings its accurate appreciation under that delicate control which is known as "self-estimation," it is for that very reason a factor of varying influence, one which may be so unfortunately admitted as to make the decision for the *proper* material *erroneous*, and yet one which just in proportion to the ability of the operator in all directions, makes it a "something" which has its place in determining his final choice.

The third proposition is that "*The location of the cavity*

*has a GREAT DEAL to do with it."* Under this heading the subject opens up more extendedly, and seems rather to call for a monograph instead of curtailing its discussion to a magazine article, for it will be found that this "great deal" is certainly so.

The time is not in the far-distant past when the idea that the *location* of the cavity had, practically, *everything* to do with the choice of the proper filling material, and "*location*" was divided, as Solomon proposed dividing the contested infant, into *two*.

This division consisted (and I think I may say consists) in assigning gold to all cavities in *front* teeth, and anything one thinks best to cavities in *back* teeth.

Is not this a scientific treatment of the proper choice for a filling material? and yet it is well known that this is so.

And upon what grounds has this division been made? first, upon the ground of *appearance*, it being accepted that gold fillings, both small and large, present the best appearance of any that can ordinarily be made in the anterior teeth; second, upon the fact that gold exceeds all other filling materials except porcelain in its maintenance of integrity both as to color and perfection of finish; and third, that *per se* fillings of this material would not discolor the teeth.

It was recognized as unfortunate that much skill was absolutely necessary for the attainment of perfect results; that much time was needed for the introduction of the fillings; that much infliction, or at least inconvenience, to patients was attendant upon such work, and that much expense was necessarily entailed—but—"if the *best* was desired *that was the best.*"

Regarding the back teeth, great latitude was permissible in all these directions; appearance was a matter of not vital importance; the non-maintenance of integrity as regards either color or polish could be permitted, and even tooth discoloration was not intolerable.

The bicuspids, especially those of the upper jaw, occupied a sort of "debatable ground" which, under the control of these same considerations secured for them gold, if it was desired and could be paid for, or amalgam, gutta-percha or "white filling," as "the next best."

My own experience during the past forty years has led me to view all this practice with nothing less than amazement, and it has been one of the chief joys of my professional life that I have had such opportunities to teach of all this from such totally different standpoints.

That I have done this in no half-hearted way is, I am glad to know, gratefully appreciated and acted upon by hundreds of practitioners, but these are even yet only the leaven, which I trust will, in time, leaven the whole loaf.

That "the *location*" of the cavity has a *great deal* to do with the choice of proper filling material is patent to even small *knowledge* of the requirements, but that any tooth, or parts of the entire denture, are entitled to special consideration I fail to see.

*That every attribute of every filling material, and, if needed, every attribute of every adjunctive material should be recognized, and, if required, utilized, is what I should teach as the basis for the choice of proper filling material for every cavity of decay in every tooth.*

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[PART FOURTH.]

HAVING thus given the *basis* for the choice of proper filling material for every cavity of decay in every tooth it will readily be seen that any such *dual* division as has been referred to would not only be unwarrantable but would be unworthy of the least consideration; and it is from this fact that I desire to so present it as that it shall be promptly recognized as having no place in the theories of dentistry and, surely, no place in dental practice.

Take, for instance, a cavity on the buccal surface of a lower molar of excellent quality; a cavity which has, for various reasons, been permitted to become very large, and which is now attended to only because of the trifling uneasiness which is annoying.

Why would not *gold* be the material *par excellence* for the filling of that cavity? And would the fact that the time required for the introduction of a filling of that material, and the expense necessarily entailed by its employment, either separately or combinedly, prevent the patient from having what

would *truly* be the *best*, make the utilization of any other material the "proper" material for the filling of that cavity? Surely not.

It is true that "circumstances" would make the employment of some other material *advisable* and *perfectly justifiable*, but whatever material is then used it is the *second best*, or *third best*, or *fourth best*, as the case might be; and then does it not become even more apparent that, as the *proper* material is not to be used, an exhaustive knowledge as to the attributes of all the other materials can alone suffice to make this *substitute choice*, of the greatest possible service to the patient?

If amalgam is chosen is it essential that it should be a "good color keeper?" Is it essential that it should be exceedingly resistant under pressure, when it is to be placed in such position as that hardly any pressure will ever be brought to bear upon it? Is it *sufficient* for the operator to know that it is made from a "Gold and Platina" alloy, or from a "Gold Alloy!" or from a "Crystal Diamond Edge"!! alloy? is this the kind of knowledge that ensures to the patient that the *second best* is *second best*?—I should say not.

If gutta-percha stopping is the material decided upon, from the belief of either operator or patient that mercurial fillings are injurious to health, is it not essential that a durable article should be chosen and that this should be manipulated by the best known methods, and how can these ends be attained unless the operator is capable of "testing" his material and is conversant with, and is possessed of, both methods and appliances? Not infrequently gutta-percha stoppings in such cavities are worthless in a year or two, while again such fillings, in such location, will maintain their integrity and perfectly preserve the teeth for ten, fifteen or even more years.

Is it to be supposed that these results are purely accidental, and if such is the supposition, is it creditable to dentistry?

Is it not vastly more reasonable to conclude that in the one case the requisite knowledge is not utilized, and in the other it is decidedly in evidence?

And when, as is sometimes the case, a greater deviation from the proper material is illustrated in the using of one of the zinc plastic "adjunctives" is it not all-important that the operator should know that this filling is purely *experimental*

and that while it may last for years, it may be practically worthless in a few months, and that he should so inform the patient?

And again is it not essential that the operator should know what it is he is using? Whether it be an oxychloride (so-called) or a zinc-phosphate (so-called) and, if the latter, as to whether it *is* an oxy-phosphate, as all of these materials are usually designated, or, whether it is a properly nitrated powder, and as such *likely* to give a better result?

Thus it is that *location* even in posterior cavities, has a great deal to do with choice of filling material.

But now let us have a small cavity in the distal face of a right upper lateral incisor; the tooth is a frail one; the left upper lateral has already, even in young life, given decided evidence of predisposition to decay; it has been twice filled with gold, and the present filling, though somewhat defective, is evidently the work of a fine operator.

This is no overdrawn picture; on the contrary there are few dentists of reasonably long experience that have not seen such, *and many have seen many!*

Is this cavity to be filled with gold?

Would it not be better to try the experiment of a gutta-percha filling?

And would the gutta-percha filling be any more an *experiment* than had been the gold fillings, one of which "experiments" had failed, and the other of which was failing?

This is a *small* cavity; is quite accessible; is in a front tooth; and is gold—simply gold, without any "adjunctive"—the *best* material with which to fill it?

Would any one of *us* prefer to have this cavity so filled if the tooth, *and the experience*, were ours?

And if I have shown that gold would be the *proper* material for the buccal cavity in a lower molar and that it would be an *improper* material for a distal cavity in an upper lateral incisor, it cannot but be admitted that *location*, whether anterior or posterior, is entitled to great consideration in the making of the decision as to the choice of proper filling material.

But more than this, when *location* is taken from mesial, distal, buccal and lingual surfaces and is transferred to the morsal surfaces, to cusps and to edges, then the large dominance of *resistance to attrition* has to be admitted with all its narrowing

complications; appearance has to be regarded or put aside; maintenance of integrity as regards both color and finish is of great importance or of little or no moment, all dependent entirely upon *location* and all equally subservient, wholly or in part, to the ability of the result to withstand the wear incident to mastication.

This is a problem to be *solved* only by the "ideal" filling material, but until such is obtained it remains one of the most important and most difficult endeavors of operative dentistry, and as such it calls most loudly for that *knowledge of every attribute* of every filling material which I have stated to be essential to the perfect choice of the proper filling material in each and every case.

"*The location of the cavity has a GREAT DEAL to do with it.*"

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[PART FIFTH.]

THE fourth proposition is that "*The depth of the cavity has much to do with it.*"

If ever the word *much* meant *much!* it does so in its connection with this fourth proposition, for we have now arrived at that parting of the ways when the whole future of any tooth rests with the decision of the dentist as to what is the *proper* material, or materials, with which to fill any given cavity of decay *as dependent upon its depth.*

Recognizing as "superficial caries" only that form of decay which admits of *advantageous* removal by files, burs, disks or chisels, we begin our consideration of *depth* of cavity as pertaining to "simple caries," and it is here that the "parting of the ways" *begins*, and here that in a largeness of degree, seemingly but little appreciated, the future of the tooth is under the control of the dentist who fills this cavity.

It is just at this condition of things that cavities of very small size in front teeth of structure decidedly below medium have been filled with gold by the hundreds of thousands, and this notwithstanding the periodic recurrence of decay and the palpable worthlessness of these fillings in from three to five years from the date of their introduction.

These cavities are returned both larger and *deeper*.

Again larger, and yet "simple caries" cavities in just such

*Burton F. Thorpe*

teeth are filled, by some, with amalgam with the idea that as gold has proven inadequate to the making of satisfactory results, it would be well to *try* something else; the amalgam is chosen without any knowledge as to the components or proportions of these in the alloy; without any knowledge as to its maintenance of color, a knowledge so very easy to obtain, one of the most important, *perhaps the most important!*—of its attributes, and without any other *knowledge*, in fact than that the alloy is the *cheapest*, or else, is the *highest priced*—for a high price is warrant for great respect from some among those who *do not know*.

In longer or shorter length of time these fillings return more or less discolored—sometimes darkened to blackness—and, again, sometimes, with so much contiguous darkening of the tooth structure as to utterly ruin the appearance of any denture.

Are not these illustrations sufficient to show conclusively that in even the smallest cavities, with the most *shallow depth*, a proper choice of filling material is that which enables the dentist to *literally hold*, largely, the future of the tooth “in the hollow of his hand?”

But it is as the cavities *increase in depth* that the responsibility of the dentist increases apace until at last the proper preparation and filling of the *deepest* of these, affords, AS I VIEW IT, *the highest possible test of supreme dental knowledge and skill*.

All along this “way” the need for accurate knowledge is exemplified so markedly that the wonder ceases, that so much trouble, dissatisfaction, pain and loss of teeth attend the effort to “save” them, and that general “experience” points to the artificial denture as the sign of the goal for comfort.

It will readily be recognized how largely dental pathology and therapeutics enters into this work as factors, seemingly, *all important*, but, with that knowledge which alone can give that acceptable, non-injurious and *most truly “thorough”* preparation of the cavities of varied *depth*, in teeth of varied structure, all is, practically, for *naught—absolutely for naught*—without that further knowledge which gives the proper

material or combination of materials, with which to fill comfortably, most permanently and altogether most satisfactorily, such excellently prepared cavities.

I have said it is as cavities increase in *depth* that the responsibility of the dentist increases in degree, but how extended is the discussion which shall show this clearly and in all its positive importance.

All the gradations from "simple caries" through "deep decay," "very deep decay," "almost exposed pulp" and even to "exposed pulp" itself must be thoroughly appreciated, thoroughly understood and thoroughly acted upon before it can possibly be recognized how completely everything of the future of all this work depends not only upon *what* these cavities are filled with, but upon *how* the proper materials are manipulated and utilized.

And is it to be supposed, for a moment, that such work is a simple thing; that knowledge for this is easily and quickly acquired; that ability to do this is an attribute usually pertaining to any large proportion of those who profess to practice dentistry?

From my standpoint I am compelled to say that I think not; and it is because of this thinking that I feel moved to urge attention to, and recognition of this need for closer and more decided thought of this, and that I use the pages of our journal to further impress that which I have tried to teach from my lecture-stand and to illustrate and demonstrate to the smaller classes in my "little Clinic Room"—I know of no other line of dental work that begins to compare with this in need for accuracy and extent of information regarding so much that is essential to the daily requirements of dental practice, and when I speak of dental practice I do not mean that usually given and received as such, but I mean that practice which *dentistry* is *capable* of giving, and which is in very truth a "boon to suffering humanity"—a welcome refuge in time of dire distress.

All this seems to me to rest upon that complete recognition of everything which pertains to any tooth that is less or more decayed and *yet is wholly vital*; and all this, again seems to me to rest, at last, upon the final work of the *filling of the cavity*.

This is the battlefield upon which war is waged between

those of one side and those of the other in every minute particular; it is here that every so-called "principle of practice" is extolled or condemned; it is here that every method, and indeed every minutiae of practice has its champions and its antagonists; it is here that it seems "doctors must disagree;" then who shall decide?

The "treatment of the dental pulp" upon which papers are so constantly written, is child's-play compared to that which is intended to forestall all need for any such treatment, and it is JUST BECAUSE THIS is so that the "treatment of the pulp" becomes a necessity.

And yet, with all this unquestionably so, does it not become patent that it is all the more to be desired that some order should be brought out from this seeming chaos and that every effort should be earnestly directed to the end that such points as can be positively decided should be settled.

To this end all should contribute, but, to contribute with contribution that has value, one must educate for the work, and it is this which I feel to urge, and for this I say that, in my experience, *no one thing is of so much importance as knowledge of filling materials and of the adjunctives to this work.*

But with this I wish it to be distinctly appreciated that I do not in the least undervalue that knowledge which I have referred to as dento-pathologic and therapeutic, for I regard this as the *foundation* for all *accurate* work in this connection, but I also desire to make it positive that *with all this* the final result is *largely*, if not *almost entirely* dependent upon the proper choice, in each instance, of the filling material, and that this choice becomes, more and more, difficult to make in proportion to the *depth* of the cavity until, with close approach to pulp, associated with adverse temperamental attributes, it becomes that complex utilization of "materials" and "adjunctives" which is, *par excellence*, the problem of operative dentistry—for upon success or failure depends the entire future of the tooth.

## [PART SIXTH.]

THE fifth proposition is that "*The structure of the tooth has most to do with it.*"

We have now reached that part of our subject which may be truly regarded as the all important, for whether a cavity be *small* or *large*; whether it be *accessible* or *relatively inaccessible*; whatever its *location* and whatever its *depth* the consideration of the *structure* of the tooth is paramount. This, at once, places discussion under four heads:

- 1st. Teeth that are very dense and sensitive.
- 2d. Very dense without sensitivity.
- 3d. Very soft and sensitive.
- 4th. Very soft without sensitivity.

It is now that the Third Article of the New Departure Creed becomes our *text*, for compatibility or incompatibility between filling material and tooth-bone has to do entirely with the *structure* of tooth tissue. In my paper to our California State Dental Association, 1899, I concluded by saying that it was sent partly "to prepare the way for a future communication to our PACIFIC DENTAL GAZETTE upon the "Consonance of Potential" and the specified using of given filling materials for the "compatible filling of teeth of varied structure,"" and it is to this point that, by systematic gradation, we have come.

"Consonance of Potential," what do we mean by this? What is "Potential?" Probably the most concise definition that can be given is that from Webster's High School Dictionary, which, though old, yet seems to cover the ground, with all its modern complications, "Potential, existing in possibility, not in act." It is then a state of existence which is capable of development into actuality under certain influence; it is possession of attributes; IT IS ITS POWER TO BE ITSELF.<sup>2</sup>

It seems to me that this series of definitions gives to the term "Potential" a tangible something, which, as it is *everything* to *each thing* it is necessary we should accept clearly as

\*NOTE.—In my lectures I used to say, "It is that which makes anything itself," but in recent discussions, having asked suggestions as to possible modifications of this *finality*, my friend, Dr. L. Ashley Faught, proposed the change to "its power to be itself," which I have accepted as more positively definite.

such in order that we shall have a solid basis upon which to build.

As potential, then, is "the power of each thing to be itself," it must be through *this* that any and every change to this *self* must be effected, whether it be a building up, a breaking down or an apparently simple maintenance of integrity.

Now, what influence and *what alone* can exert such power as to *cause to act* these dormant possibilities? Can any other than the *potential* of some other thing? And what can eventuate in producing these results other than the *difference in potential between the two?*

Thus, then, it *must be* that the nearer alike any two potentials are the greater would be the "consonance" of these potentials and possibility of *harmony*; while, on the other hand, it equally *must be* that the greater the difference in potential the greater would be the "disonance" of these potentials and consequent producing of "clash."

Dependent, then, upon *what* is desired is the question as to whether *consonance* or *disonance* of potential is desirable.

If, for example, a current of electricity is desired for any purpose, it would ensue that the greater the difference in potential between the anode and cathode the more satisfactory would be the result.

If, on the contrary, *stability* is the object desired in the bringing together of potentials for any purpose, it again *must be* that so far as is compatible these potentials should be in *consonance*.

In the former "clash" would be the desideratum; in the latter "harmony" would be the condition to be obtained.

The former would be illustrated by the juxtaposition of zinc and copper, zinc and platinum, zinc and carbon, or by the transformation, by proper appliances, of the energy of the steam engine or the waterfall.

The latter would be illustrated by our choice of red cedar rather than hemlock for our fence posts.

And now it becomes needful that, as in the early consideration of our subject, we should proceed carefully, step by step, until we have reached the teeth and the various filling materials and adjunctives we would utilize for the *saving* of the variously structured dentures given into our care.

I wish to emphasize here the word *saving*, as it is so often deemed synonymous with *filling*.

The first article of the New Departure Creed reads thus: "In proportion as teeth *need* saving, gold is the *worst* material to use," and this has been *travestied* by would-be critics into "In proportion as teeth need filling gold is the worst material to fill them with." With the most appropriate query, "Do not *all* decayed teeth need filling?"

Comment seems *needless* even here, but I am desirous that thought should be given such points as we pass along.

Filling is filling, but *saving* has been proven to be a very different thing, as masterpieces of manipulative skill have *declared themselves* impotent while other efforts evidently inferior from the "filling" standpoint, and even *doubted when done*, have *declared themselves* equal to the emergencies.

It is next for us to recognize that no potential can be *known* other than as a mere existence until it is *tested*; and, again, that *facts of observation* are the foundation upon which to build theory, and that whether the theory prevail or fall the *facts* remain the same, for if they do not they are not *facts*.

And, further than this, it must be remembered that no potential is *fully* known, no matter how much is known of it, as any tomorrow may give evidence of far more wonderful potential pertaining to anything than has heretofore been deemed possible to the most remarkable.

That all these considerations pertain to dental thought and work is admitted by all thoughtful and working dentists, but it is *known to them alone*, and only so because they have given so much thought and work to them.

A familiar illustration of this is the *immense amount* of experimental work which has been given to the production of an "ideal" filling material, and the ignoble failures which have, thus far, resulted from these efforts. And this, again, is accentuated by the knowledge that it has proven vastly more difficult than some of the very abstruse and singularly varied demands of photography, and that, as its *incentive*, there are "*millions in it*."

To what alone can this be due? Manifestly to the combined potential of the teeth and of the fluids of the mouth.

It will be seen that every paragraph of our discussion brings

us nearer to our point of destination, viz., the consideration of the varied potentials of teeth; of the fluids of the mouth; of their concomitants; of filling materials, and of the adjunctives used in the endeavors to arrest the progress of dental caries and supply an acceptable substitute for such tooth tissue as has been lost.

It is *one* point upon which all dentists are agreed, that no filling material, nor any known combination of filling materials and adjunctives can, in anywise, be regarded as "the ideal filling," and it must be admitted that, under these circumstances, the results which clinical experience has proven attainable in efforts to *save* teeth of every variety of structure is most creditable to dentistry.

And it is just here, in this connection, that it seems proper to ask if this *general* advance in *saving effort* does not pertain markedly to the last twenty-five years?

I would ask if *operative practice* has not, during that period, so changed as to be unrecognizable from old-time standpoints?

I would ask if the *results*, in lines of work that twenty-five years ago would have been deemed by the vast majority of dentists as unworthy of attempt, are not eminently satisfactory?

I would ask if this increase of success, where success seemed almost impossible, can be attributed to an equally decided *increase in manipulative skill*?

Is it to be supposed that "the noble army" of ancient days would admit this, or that the representatives of "wonderful progress" would think of claiming it?

And, if the first three of my queries are answered as I should answer them—yes!—and the last two are answered as I should answer them—no!—then I would ask, to what *is* all this changed utilizing of means and methods and this increase of saving of the dreadfully soft, poor structured teeth due?

To which *I* should reply that it is because of the rapidly growing increase in the utilization of materials more facile of manipulation, and which are proven, experimentally, to be more in "Consonance of Potential" with tooth-bone.

## [PART SEVENTH.]

IT will be noted that in the classification of teeth from "very dense and sensitive" to "very soft without sensitivity" we have every variety of tooth structure that can possibly exist, as all degrees of density pertain to teeth *above medium* in structure, while all degrees of softness are found in teeth *below medium* in structure.

Beginning, then, 1st, with *Teeth that are very dense and sensitive*, we have a condition in which recurrence of decay is practically ignored as an event not to be considered; but, while maintenance of integrity of filling material has always an important place in connection with the filling of all teeth above medium in structure, we are, in this *extreme* of our first class, confronted with the paramount consideration of *Comfort*.

In such teeth caries is found almost exclusively confined to sulci, while other sensitivity is associated with fractures of teeth or with abrasions from occlusion.

These lesions induce, in varied degree of severity, such discomfort or pain as is incident to irritation of sensitive dentine from the usual salt, sweet or sour irritants; from direct touch or *impact*; and possibly, in some degree, from undue heat or cold.

The location of trouble having been diagnosed, an unbearable infliction is found to result from the slightest attempt to excavate, but with the varied methods and medicaments a preparation is finally effected, and the extreme sensitivity is sufficiently obtunded to permit of the introduction of a filling.

It is now that clinical experience, that greatest and best of teachers, soon tells us that "just in pro ortion" to *extreme of sensitivity* any filling material which, as the result of its introduction, produces *impact*, is contra-indicated, as sometimes almost immediately, and always more or less promptly, uneasiness of the tooth, followed with pain, is the sequence.

This uneasiness or even pain is almost always promptly relieved by the mere removal of the filling. It is therefore from *this want of consonance* that gold—or, in some exquisitely sensitive cases, tin—is not the proper filling material, so rendered by the structural sensitivity.

But as gold is, almost absolutely, the best filling material

for teeth of dense structure it *may be* now utilized by following the method of fifty years ago for overcoming that *conductivity* which in very deep cavities has proven prejudicial to pulps.

This—applicable only to soft foil—is the introduction of the first pellets with *very gentle pressure* and making gradually increased condensation until the face of the filling has that coin-like surface so desirable.

These fillings—soft as velvet at the bottom, and hard as coin on the face—did excellent service in both pulp and tooth preservation, and are *more and more worthy* of trial in very dense and sensitive teeth as the *sensitivity diminishes in degree*.

But, inasmuch as in extreme instances, even this will be found unendurable, a greater consonance is found, in zinc-phosphate cement, the potential of which seems especially adapted for this work.

As I have, necessarily, to give fully the attributes of each filling material and adjunctive as they are utilized—from the fact, as I have shown, that it is the *attributes* of anything, which is its *potential*, I shall thus speak of zinc-phosphate.

It is not to be denied that the nomenclature of dentistry is to be credited with descriptive, concise practicality, rather than with “scientific accuracy,” but there is *no warrant* for the almost universal name of “oxyphosphate” as given to those cements which are the *nitrated oxide of zinc* products, such as Poulson’s, Fletcher’s, Justi’s, Harvard, Dawson’s, Hammond’s, and others of that class.

It is true there are a few of these cements which use a phosphoric acid menstruum with a calcined oxide of zinc powder, but none of these will make a cement worthy the name of “zinc-phosphate.”

If it could be understood that by the name “oxyphosphate” was meant some one of these inferior products, it would be well, but this name is used for the good and the poor alike, which is not just to either.

There is *no oxide of zinc* in the powder of any properly prepared “zinc-phosphate”—not that it might not be possible to again make oxide of zinc from *nitrated oxide* but that *no such*

*transformation is made* by the processes used in making "zinc-phosphate" powder.

The oxide of zinc is *accurately nitrated*; this can be done by adding to an aqueous suspension of the zinc just sufficient nitric acid to *clear* the milky fluid—this is then filtered and evaporated until a hard cake of *nitrated oxide* remains, this is broken up, placed in crucibles and subjected to glowing heat for from thirty minutes to an hour; it is then ground to an "air floated" fineness, as nothing less than this grade is sufficient.

We are told by chemists that this result is again *oxide of zinc*, but this powder has *nothing* in common with that from which it was made; its "feel" between the fingers is entirely different; its color is light yellow instead of white; its weight, in equal bulk, is *more than twice* that of oxide of zinc, while its *product*, with phosphoric acid solutions, is utterly distinct from that of the oxide.

For these reasons I hold it not correct to call "zinc-phosphate" oxyphosphate.

As I have said, the potential of zinc-phosphate seems specially adapted to the work of filling, at least temporarily, cavities of decay in teeth which combine *exceeding* sensitivity with *exceeding* density.

This is because, 1st, it is introduced without *inflictive* pressure; 2d, it adheres strongly to the walls of the cavity; 3d, it is not only non-irritating, but its phosphoric acid is accredited as an obtunder of sensitive dentine; 4th, it neither shrinks nor expands, therefore neither impacts nor leaks; 5th, in places exposed to attrition its clinical record for durability is remarkable, many such fillings being *now good*, after from six to twelve years' service; 6th, in places exposed to the known solvng power of fluids of the mouth, the surface of the filling can be protected by "combining" a covering of amalgam.

From such considerations, then, as I have given, it will be noted that *gold, tin, lined amalgam or zinc-phosphate* are the materials to be utilized for the making of fillings in the *extreme cases* of our first division structurally.

It will further be recognized that in proportion as sensitivity diminishes, so the utilization of the more surely permanent filling materials increases until, as confidence is the more

decided as to the permanent removal of dentinal complications we gradually reach that condition which "all dentists are pleased to see" and which we find as

2d. *Teeth that are very dense without sensitivity.*

This is the realm of the "king of all filling materials."

These are the teeth, most positively, of the sanguo-bilious temperament; the dark yellow teeth, large and strong, with splendid enamel, strong dentine, firmly planted in the jaws, which are of the flat-arched type with prominent cuspids.

It is seemingly natural that such teeth should not be liable to decay, and that imperfect or fissured sulci should remain unfilled, sometimes for a lifetime without detriment, but it is found, in even these dentures, that certain of the teeth almost always develop tendency to decay, and it is therefore, sometimes, that comparatively large cavities are presented associated with which, however, is rarely—very rarely—pain, but which give inconvenience from collecting food; from attraction toward cavity edges, of tongue; or from mere knowledge of their existence.

It is for cavities in such teeth as these, and in those of the closely allied teeth of the bilio-sanguine temperament, whether they be small or large; whether they be in front teeth or back teeth; whether they be simple cavities or even very deep, that *gold* is *par excellence*, the material with which to fill them.

It is in these cavities that *gold*, even reasonably well introduced, does remarkably acceptable service, and that *gold fillings*, made as they should be, are likely to "last a life time."

It is in these teeth also that, occasionally "circumstances" compel a second choice of filling material, when, with the alloys of the present day, it would seem as though *amalgam* was the only alternate.

In years gone by, *tin foil* was the alternate, and again, "circumstances" may be such as even yet to induce its employment, for, next to *gold*, *tin* is a most excellent filling material.

In such teeth, in such jaws as we are discussing, *tin* is unequal to the attrition sometimes likely to be given it, but in cavities where fillings are not subject to direct wear from mastication it makes a durable and entirely unobjectionable filling.

But the introduction of a *tin* filling is, practically, not less than one of *gold*, and it is therefore, with the present methods,

almost as much a question of *time*, while, except in fillings of more than average size, the *actual cost* of material is a consideration of comparatively minor importance.

For this reason, then, as I have said, it would seem as though *amalgam* was the alternate.

It is here that these alloys which are of the "usual" or "contour" class, seem only to be considered, for these *have now done so many years* of acceptable service in teeth of good structure that it seems unwise, in this connection, to experiment, and it is therefore at this point that *knowledge of amalgam alloys begins to have importance*.

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[PART EIGHTH.]

HAVING referred to *tin* as a possible second choice in the filling of cavities of decay in teeth which are "very dense without sensitivity," I have yet said that inasmuch as *both* time and expense were the usual factors urging to this second choice, *amalgam* seemed to be the alternate, and that this conclusion brought us to that point in the practice of operative dentistry when knowledge of amalgam alloys *began* to have importance.

That this *is* the beginning is proven from the fact that it is in such cases that *almost no knowledge* is necessary for the accomplishment of what may be called *useful results*. Almost any alloy, made into amalgam in almost any way, introduced in almost any fashion, will almost always give satisfactory service, but it cannot be denied that an appropriate alloy, made properly into its amalgam, and introduced and finished as it should be, would make a much better filling and be, in every way, vastly more satisfactory and more creditable to dentistry.

It is therefore *proper* that an alloy should be chosen which will make a *non-discoloring* amalgam; one which will make a *strong* amalgam, as, in such teeth it will be liable to be subjected to hard usage, and this again, in proportion as the filling will be exposed to attrition; one which will make an amalgam that will "*set*" with *celerity*, that it may be promptly

finished, and this especially when *time* is largely a consideration for second choice.

And is it to be supposed that the advertisements which state alloy and amalgam attributes should be the foundation upon which *dentistry* should rely for its knowledge in this regard? Would it not be better that every dentist should "test" these things and thus know of his own knowing? And would it not be a step forward that society work should trend toward such experimentation as would give reliable information concerning these materials which are *so much* to both patient and operator?

It may well be admitted that I have not used the word "importance" as the concluding one of my last article without weighing its significance, for, as I view it, knowledge of amalgam alloys and amalgam working has grown to be one of the most important items of a dental education; the item upon which, probably more than any other one, will depend the failure or success of any future dental practice.

I base this opinion upon five reasons: 1st, because with an intelligent use of amalgams one can accomplish far more in the work of *saving teeth* than with any one or all of the other filling materials together.

2nd. Because in despite of all opposition, misrepresentation, inferior and objectionable, manipulation and pseudo-scientific handicapping, amalgams have so demonstrated their value as that in the short period of twenty-five years they have risen from obloquy and comparative disuse to the position of the *most used* of any filling material.

3rd. Because amalgam so nearly approaches the "ideal" filling material in so many points, that, unless the *absolute ideal* is given to dentistry it will retain its present position, and, as it is better known and better worked, will gain in position as a reliance, even more than it has already.

In support of this reason one has but to compare the attributes desired for the "ideal" with those possessed by amalgam as made from its various alloys:

## ATTRIBUTES OF "IDEAL."

1. Easy to mix.
2. Easy to introduce.
3. Adhesive to cavity walls.
4. Sufficient plasticity for continuous manipulation.
5. Sufficiently rapid hardening after completion of filling.
6. Possessing good edge strength.
7. Maintenance of form integrity.
8. Resistant to attrition.
9. Non-irritant to pulp.
10. Compatible with tooth structure.
11. Non-conductive.
12. Capable of being colored to match the tooth.
13. Capable of being finished with enamel lustre.
14. Insoluble in the fluids of the mouth.

It will thus be seen that of 14 attributes amalgam quite completely meets 12 of them, while the remaining 2, though *all important* to the complete "ideal" are just those which, as yet, have been found absolutely unattainable except in porcelain.

4th. Because, notwithstanding the almost universal use of amalgam by dentists, its proper use and proper using is so far from general, as that I may truly say it is very exceptional.

In support of this it is only necessary for an expert, or even one tolerably proficient, to witness its usual, or ordinary, using.

From the selection of alloy, without any knowledge of its appropriateness, to the making of its amalgam in the crudest palm fashion, without the slightest idea of proportions of alloy and mercury, as positively governed by requirements, to the final introduction of the material, sometimes by smooth instruments, sometimes by those with serrations, sometimes cold,

## ATTRIBUTES OF AMALGAMS.

1. Easy to mix.
2. Easy to introduce.
3. In combination with zinc-phosphate this is accomplished.
4. Sufficient plasticity for continuous manipulation.
5. Sufficiently rapid hardening after completion of filling.
6. Not so good edge strength as gold, but very fair edge strength.
7. Not detrimentally insufficient in this regard.
8. Resistant to attrition.
9. Non-irritant to pulp.
10. The most compatible, *in its variety*, of any filling material except gutta-percha.
11. Of low conductivity.
- 12.
- 13.
14. Insoluble in the fluids of the mouth.

and even sometimes warm! Sometimes by rubbing, sometimes by pressure, sometimes by tapping and sometimes by malleting! all is indicative of anything, and indeed of *everything* except either system or knowledge.

In proof of the probable continuance of this it is only needed to read the teachings given in the American Text-Book of Operative Dentistry, pp. 231 to 239 inclusive.

I regard it as fortunate that *a few* are able to demonstrate *how* alloy should be made into amalgam; *how* it should be worked in the palm make; *how* it should be introduced into a cavity; *how* it should be "wafered" if wafering is indicated; *how* the wafer should be utilized; *how* the filling should be trimmed, smoothed and polished, in the comfortable, non-inflictive, prompt and satisfactory way in which it should *always* be done.

I hope the folly of the rubber dam accompaniment to this work will, *poco a poco*, become so evident as that it will be utterly discarded, for, with proper manipulation, it is an adjunct which is entirely unnecessary.

5th. Because the stereotyped enunciations antagonistic to amalgam are gradually becoming less in frequency, and, when given, only evoke a smile, while the triumphs of amalgam, *properly used*, from the wisdom teeth to the *median line of the dentures*, are proving it to be "the saving grace" of the teeth, all of which seems to me sufficient warrant for the continued belief that "truth is mighty and will prevail."

That the proper using of amalgams is a work requiring both much knowledge and great skill is admitted in exact proportion as one becomes conversant with its demands, just as the utilization of a violin or a set of chess-men becomes both a science and an art in relative degree with the users' proficiency, while the comparatively short space of time consumed in the introduction and finishing of the fillings will be found to give greater opportunity for the cultivation of the more scientific study and practice of dental pathology and dental therapeutics which, in my experience, I have been led to regard as the *true* "saving grace of dentistry."

## [PART NINTH.]

HAVING written as I have regarding the choice of alloys and the making and using of amalgams it would seem that such assertions would sufficiently entail the necessity for at least a few salient directions as to methods in this work, even though our papers are *strictly* discussing merely the "choice of proper material"—but comparatively recently given "methods" are so entirely at variance with all that I should esteem desirable, that it seems no less than a duty.

Take, for instance, the method given by Dr. G. V. Black in the *Cosmos* of December, 1896, p. 973: In "part eighth" of my Review of the work of Dr. Black I have given at length my reasons for ranking his method as simply absurd from beginning to end, but I refer to it as accentuating what I now say regarding amalgam using, for, if one who poses as a teacher adds such teaching, to that of the generally accepted "Text Book," it would be strange indeed if amalgams should not be dreadfully misused.

But these are not alone in their peculiar educating, for during the Spring just passed directions were given that seemed truly the echoes of a long-gone time when lamp-lighters, with their little ladders, made their rounds and cities were lighted by oil lamps!

The conclusion of this method was the removal of excess of mercury by "one or more pellets of tin"; the bringing to "a smooth surface with a soft pine stick," or "with a pellet of bibulous paper and pumice held with pliers," and finally "wait *several hours!*" for a finish.

When we remember that "quick-setting" amalgams have been in use experimentally for a dozen years, and that teachings and clinical demonstrations of them have been given for seven years; and that these have been increased in number until now there are many accepted alloys that make amalgams which will "set" in from thirty to forty minutes sufficiently to take a *burnish finish*, it seems odd, to "wait several hours."

In the using of amalgam for the filling of cavities in teeth which are "very dense, without sensitivity," I have said that a quick-setting, strong, non-discoloring amalgam should be chosen. This, of course, practically excludes all copper, coin

or other sub-marine amalgams, even though these would undoubtedly do good service in cavities in molars where discoloration of filling, or even of tooth, would not be a matter of serious moment.

It would also exclude *absolutely* all so-called "White" or "Facing" amalgams whose *chief* attribute is maintenance of color; I emphasize the word "chief" here because although maintenance of color (with elimination of injurious components such as cadmium) should be *the* chief attribute of an amalgam truly "White" or "Facing" there are yet a number of alloys which are called "White" and which will "test" well as color-keepers, and yet which possess fair edge-strength and which set with reasonable celerity, such as "Dawson's" and others of that class, but my *choice* would be any strictly legitimate alloys of the "contour" class, such as have been furnished by many makers, and used for the past twenty years.

With such an alloy I should *first* experiment by weighing proportions of alloy and mercury that I might know how, *accurately*, to make an *average* or *soft* mass of amalgam as indicated desirable.

Even with my forty years of amalgam using, I am all the time more and more impressed with the value of this preliminary; primarily it is of importance just in proportion to the goodness of the alloy, for it will be found, by experiment, that so tiny a globule of mercury as would weigh only one grain will make a decided difference in the mixing and using of a mass of amalgam of sufficient size for an ordinary filling, say from 10 to 20 grains.

For the weighing of mercury and alloy I prefer a two-plate scale—with removable plates—for with such the globule of mercury needed for any given filling is soon closely approximated as to size, (about two-thirds the size of the cavity) and the mercury being placed in one scale the alloy is weighed *light* or *heavy* or *equally* as evidenced by the position of the scale beam, and as desired for any given purpose for any given alloy.

This soon becomes a "habit of make" by means of which any amalgam mass is made as it should be done for each special purpose.

For example, if certain portions of any cavity should be so shaped as to render it important that the greatest edge-strength possible to the amalgam should be attained, it is proven, by testing, that if *just sufficient* mercury to make a workably plastic mass is used and the mass is allowed to make its *natural set* the edge-strength will be at its strongest.

Again, should it be desired that the mass be made more plastic, in order that greater facility and perfection of its insertion be assured to completely fill the cavity, that then a surplus of amalgam, thoroughly made into a "wafer," might be utilized to *hasten the setting*, this should be done in such cavities as will be filled with strong square-edged fillings, such as *need* strength of edge in smaller degree.

NOTE--I have been in the habit of explaining in lectures that the "increase of edge-strength" referred to as resulting from "wafering" on p. 204, "Plastics," was that gained over such as resulted from the natural setting of soft made amalgam, and not as a means for making the best edge possible to amalgam.

Having then placed upon one scale plate the approximately sized globule of mercury I should balance it (light, even, or heavy) with the alloy and make a mortar mix.

For this my preference would be a glass mortar, *delicately ground*, and at once we here begin with the proper, or more or less improper manipulation of amalgam, for, while it is true that alloy can be amalgamated in any kind of a mortar from porcelain to India rubber, and indeed in the palm of the hand (as has been done for almost a century), it is yet easy to demonstrate the advantages of a mortar mix, and as well, the advantages of the ground glass mortar over all other appliances. If for no other reasons than neatness and cleanliness the glass mortar would be preferable, but with an acceptable glass mortar every attribute is superior to those of any other kind.

But here we must admit the difficulty of obtaining *acceptable* glass mortars, a difficulty which is so great as, up to the present time, to practically preclude the possibility of getting them.

An amount of *care in moulding* them, even with a perfectly accurate mould; of *exceeding care* in taking off a proper pro-

portion of the smooth inner surface, and leaving the "ground" portion *rough enough* and yet *not too rough*; this is most important; of care in the shaping the ball of the pestle, that it may properly mull the amalgam and be readily and perfectly cleaned, all tend to make a glass mortar and pestle expensive or to make a cheap one undesirable.

Again, the danger of air-cracking is one which seems to be impossible to avoid, even with the most careful and prolonged annealing—and yet—with all these objections, I very much prefer the glass mortar, and, so far as I know, those who use them agree with this preference.

Next to the glass mortar is the "Wedgewood"—and with these there is decided choice as to glaze or roughness, which also pertains alike to mortar and pestle.

Besides *having* a mortar for the making of amalgam it is essential to *use* it—and here again directions are so varied as to be surprising, while it only requires a trial to show that *thorough* and moderately *long continued* mulling is necessary for the best making of any amalgam. I think it will be demonstrated to nearly every amalgam worker that almost, if not quite, *as much again* mulling of amalgam mass as is usually given will yield a material of such decidedly increased velvety plasticity as to be fully compensating, and I should therefore advise the trial.

Having made the mortar mix the mass should be gathered by the finger from the pestle and mortar into the palm of the hand and is kneaded until it becomes a "button."

As I have written upon this very precisely, and as this manipulation, even now, so *tests* the *plastic-filler*, I cannot do better than refer to "Plastics" pp. 91 and 92.

I think I have left it clear that in teeth which are very dense, without sensitivity, amalgam, made from proper alloys, is a very acceptable "alternate," or "second choice" for the filling of their cavities of decay; and yet I have left it definite that, almost without exception, *gold* is their *proper* filling material.

The exceptions would be in enormous cavities in such "peculiarly predisposed to decay" teeth, as have been referred to as occasionally pertaining to such dentures.

I have also admitted that "sub-marine" or discoloring amalgams might be admissible when such discoloration would not be seriously objectionable; but it now is in place to make again mention of "lining" which was spoken of in connection with hyper-sensitivity of dense tooth structure when zinc-phosphate was to be protected by amalgam.

Then many reasons were given for that peculiar use of what was practically a "lining," but I refer to it now as of but *one* use, viz.: preventive of possible discoloration of tooth.

As I have permitted discoloration in non-conspicuous positions so I must *insist* on its positive prevention in all conspicuous and even semi-conspicuous positions, as it is this possibility which has permitted the use of amalgam in teeth from centrals to bicuspids inclusive.

*Lining*.—"Consists in covering the inner surface of cavity walls, either partially or entirely, with a thin stratum of material which shall subserve the purpose either of preventing recurrence of decay; or of affording support to unyielding filling material which would otherwise rest upon an unsubstantial foundation; or of preventing discoloration from filling materials liable to tarnish; or of precluding the possibility of clouding from leakage; or of strengthening frail cavity walls." (See "Plastics," p. 190.)

It is of the utilization of this method in all such cavities of decay in dense, non-sensitive, anterior teeth, as from their size; or their labial or buccal proximity; or the thinness of their walls, *might* permit of even the slightest discoloration of tooth-tissue from *possible* amalgam tarnish.

For this purpose I should teach the "combination" filling which I have used now for *twenty years*, and can, therefore, speak most solidly regarding it.

"Combination filling" is the name which I gave to the using of zinc-phosphate and amalgam, while both were in a plastic condition, and thus were *combined*, in contra-distinction to the "composite" work of *lining* the cavity with oxy-chloride and allowing it to "set," and afterward introducing either gold or amalgam, thus making a filling *composed* of two materials, but not *combined*.

The advantage of the "combination" over the "composite"

filling, as associated with very dense teeth is four-fold; *first*, the amalgam follows the introduction of the zinc-phosphate immediately; *second*, there is, practically, no danger to pulp from the action of the phosphate (if such exists) as the dentine is too dense; *third*, tho the tooth-saving attribute of zinc-phosphate is not yet positively known to be equal with that of zinc-chloride, it is yet *sufficient* for dense tooth-bone, as such structure rarely permits recurrence of decay, and this "lining" is only to prevent discoloration; *fourth*, altho zinc-phosphate is not so hard nor so strong as a *properly* mixed zinc-chloride it is yet hard enough, and dense structured cavity walls are usually strong enough even tho thin.

The fluid and powder having been placed upon the mixing slab, the amalgam mass (soft), is made and held in the palm of the hand (see "Plastics," p. 92), while the zinc-phosphate mix is made; this is then placed on the side, or sides, of the cavity from the point of the spatula.

NOTE—The *taper point* of the spatula is an *essential*; the round and square ends of spatulae, so frequently diagrammed, are not only purposeless, but with such the use of the point is lost.

Having thus placed the lining in position approximately, it is *accurately* brought to the desired feather-edge, at cavity opening, by the introduction and manipulation of the amalgam, which is done *deliberately* and *carefully* to the ends that the walls are completely lined, and that the lining is completely covered, all which is accomplished without any special regard to the immediate completion of the filling as a *necessity*, for it is much more important that the *lining* and the *covering* work should be perfect at this juncture, as the remaining concavity of amalgam can easily be filled and the filling finished by cold soldering ("Plastics," p. 177), *as soon* as it is found that the important part of the work is satisfactory.

This possibility is an *immense relief* in all "lining" work just in proportion to the size and irregularity of cavity and edges; the relative inaccessibility of cavity; the incidental fatigue to the patient and the anxiety of the operator, and is well worthy of occasional trial, even in simple cases, that one may thus be *prepared* and *confident* in times of need.

## [PART TENTH.]

ALTHO, as I have said, all degrees of density pertain to teeth *above medium* in structure, it will nevertheless be accepted that this density becomes less in proportion as we approach those which are recognized as "medium."

But in this approach we pass the finely structured and well-planted teeth of both lymphatico-sanguine and lymphatico-bilious temperaments, in connection with which the teachings and methods given, as pertaining to the bilio-sanguine and sanguo-bilious teeth are practically the same; and yet such slight increase of complications as certainly demand increased care from the pathologic and therapeutic standpoints will necessarily be in evidence.

It will be found that teeth of these dentures having that individual pre-disposition to decay which has been mentioned as possible to all dentures, will be better saved by increased utilization of plastics as "linings" associated with gold principally and amalgam incidentally.

I wish it to be noted that in the work of filling teeth from the *saving*, instead of the *manipulative* plane, esthetics have had as large a share of consideration from plastics as ever it has had from those who esteem gold as *the esthetic* of dentistry; indeed it has, from the earliest work of the "New Departure Corps," (which I claim to be the beginning of systematic plastic work) been regarded as one of the most important features of its practice, and it was in this interest almost as much as in that of the *saving* of the teeth that I devised the work of "lining," and it is the consequently great importance that I attach to this, which will make me advocate it strongly, and teach it minutely in these papers.

To impress this I will say that without its varied "lining" work plastic dentistry could do but little more than *save* the poor teeth of the frail dentures, and of these, mostly those situated posteriorly, while with this work, artistically utilized, plastic dentistry can do almost everything required of operative dentistry, and do it with a combined *beauty* and *durability* which cannot be equaled in any other way.

Were it not that, as I have said, I am writing of that which I have for many years taught and demonstrated in the clinic

room and in my practice, it would seem strange that I should now say this, for it is no new or untried thing, and by no means a new enunciation, as it is exactly what I said more than twenty years ago (*Cosmos*, September, 1878), and what has been done for many hundreds of patients ever since that time.

And yet the denunciation of this work continues; the extolling of *that* which *gave rise to this* is yet indulged in, and, more than this, the status of dentistry, even now, is stated to depend upon proficiency in such manipulation as has proven itself utterly incapable of satisfactorily responding to the requirements demanded.

It is *this* which I feel it my duty to antagonize; *this* which I desire to urge thought upon, that it may be stamped out as a disgracefully mean and narrow base upon which to place so broad and capable a calling as is the "Profession" which we practice.

Having passed the teeth of the lymphatico-bilious temperament we have now reached that most interesting grade of tooth tissue associated with our nervo-bilious patients.

With these long, narrow-necked, yellow and blue teeth, well-planted, with hard and polished enamel but with that softly organized dentine so prone to decay and so generally very sensitive, we find that tendency to rapid, horny caries, which gives us large cavities with small orifices, together with such increased specialization of decay as pertains notably to upper lateral incisors and upper bicuspids.

With this nervo-bilious temperament, besides the usual general decay we find, almost as a rule, in comparatively early life, discolored upper laterals resultant from primary decay, repeated recurrent decay and final death of the pulp, either as a natural sequence or due to intentional devitalization.

But more than this the absence of one or more of the upper bicuspids is so almost universal, in equally early life, as to have caused Professor Elisha Townsend, so eminent as an operator, to have given these nervo-bilious bicuspids the name of the "American teeth."

And this condition of things, so conspicuous in his day, forty or fifty years ago, is but little less so today.

This then was one of the problems for plastic dentistry, and

it has been solved with highly gratifying results; the dentures of those patients who have always been under such treatment as I advocate in these papers, have practically no discolored laterals, and usually have all four upper bicuspids; while even those with such teeth as have experienced primary decay, and even one or two recurrents, yet have their teeth and with scarcely any indications of all this previous trouble.

It is with these teeth, then, that with their primary decay we can commence the utilizing of their excellent enamel for the maintenance of both form and appearance; and especially with them that we can continue this conserving practice as the enlarging of recurrent decay gives us even greater disproportion between the cavities left by decomposed dentine and the orifices of these, circumscribed by overhanging enamel.

It will readily be admitted that for a gold preparation it is well made just in proportion as all this enamel is removed and strongly finished edges given to the cavities.

This necessarily makes large and larger fillings, while with the *lining* process the enamel walls are sustained instead of having to sustain, and are strengthened by support, instead of being weakened by pressure from impact.

And, besides all this, the color of the tooth is accurately retained by the choice of an accurately shaded *lining*, thus adding greatly to the beauty of the work.

It is with these teeth that the complications of vital processes with pathologic, therapeutic and operative dentistry, not only begin to be simply immense, but that possibly they cover an extent which is, at most, rivaled rather than exceeded by the demands of conditions pertaining to "treated" teeth.

We have here, as a first consideration, the conservation of the pulp, and this, which in all previous work has been a comparatively easy matter to even ordinary proficiency, now becomes a difficult matter, greatly increasing in difficulty with every degree of approach to pulp, and with every diminution of systemic ability, for, we have now a temperament (*and consequently a pulp*) which is not only markedly and promptly recuperative, but which also may be markedly and promptly the reverse.

It is, therefore, in these teeth that the conservation of de-

calcified dentine is as important, in its way, as is the conservation of enamel for the reasons already given; and thus it will be seen that we are now controlled largely in our *choice of proper filling material* by our decision as to what we will do with the decalcified dentine.

It is now more than forty years since, as the result of much argument, Prof. Robert Arthur convinced me that, *theoretically*, the leaving of decalcified dentine in the cavity when its removal would endanger the integrity of the pulp (even in less degree than exposure) was the only proper practice.

Believing what he told me of his results during ten years of experience, I commenced that clinical testing which, for me, could alone confirm or disprove the solidity of his teaching, and, as I refer to what I wrote twenty-five years ago (*Cosmos*, November, 1875, p. 564) I clearly recognize how much more cordially the experience of the added twenty years enables me to urge the leaving of the decalcified dentine even in *greater quantity* than was ever advocated by my esteemed teacher—Prof. Arthur—and especially in just the teeth and kind of structure we are now discussing.

At this time (as then) I shall sufficiently define my own position by the statement that, as the result of all these (forty) years of experience, I find quite frequent necessity for the adoption of the practice, and have many hundreds (now thousands) of teeth which today are rejoicing their possessors by their natural translucency, instead of increasing the number of the host of discolored teeth which are the results of what is known as "*thorough*" excavation.

That I may be clearly placed on record in this regard, I wish to teach—as I have done for quite a number of years in lectures—that all *pulp* considerations in connection with the leaving of decalcified dentine in cavities of decay pertaining to soft-structured teeth, have long since been ignored, unless in exceptional instances of "*very deep*" decay, while all thought has been given to *filling integrity*.

This principle of practice has therefore given the formula "*conserve all decalcified dentine consistent with integrity of the filling.*" Upon which principle I have practiced and cliniced for so long a time as to have sufficiently demonstrated its immense value.

In this connection, I have found the oils of cloves and cinnamon my best reliance for both disinfection and antisepsis; while periods of time varying from fifteen to thirty-five years amply testify as to their durability, and to the important part which they exercise in their *permission* of re-calcification of decalcified tooth tissue.

This point, as associated with the work of recalcification of decalcified dentine is so important that I wish not only to impress it but to make it perfectly clear.

It is therefore to be recognized that only *corrective* applications are to be made with reference to existing conditions and by no means are any medicaments to be used which can *possibly* interfere with such desired future action as is entirely under the control of *vitality*.

With these thoughts in view the first indication is to cautiously remove the contents of the *cavity* of decay, recognizing that the basal boundary of the cavity is that portion of remaining dentine which is merely more or less decalcified and equally more or less responsive to either litmus or turmeric paper as it is *now* hyper-acid or hyper-alkaline.

If hyper-acid the treatment for neutralizing this condition is, of course, governed by its degree, and calls for applications of prepared chalk or bi-carbonate of soda, slightly moistened, or of aqua ammonia fortior applied with precision, and with due regard to its pungently irritating evaporation.

If hyper-alkaline the application for a minute or two of dilute vinegar (one to two or three of water) is usually sufficient to induce a neutral response and there then remains only the consideration of the concomitant micro-organisms which are the attendants upon decay and which are so strangely and so erroneously taught as its *cause*!

“*Disinfection*” is simply the prompt and energetic antagonizing of these organisms in infectious matter or tissue; “*Antisepsis*” is intended to prolong, as indefinitely as possible, exemption from further infection; the first may be accomplished by remedies which are so potent as to produce almost instantaneous disinfection, but which from their potential are practically incapable of any long-continued antiseptic action; the second result is produced by remedies which though they

may be not nearly so promptly disinfective, are nevertheless, vastly more durable in their maintenance of the integrity of decomposable tissue.

With all this, there is yet *more*, for us to think of in connection with the decalcified dentine which it is proposed to leave, for the two-fold reason that it is such tissue as can, *possibly*, be made the most acceptable of any covering to the tooth pulp, and, as well, that in the event of recurrent decay there *may be* a basal boundary, for the future, of solid instead of softened dentine.

It is for these reasons, then, that I have recommended the oils of cloves and cinnamon as medicaments possessing in marked degree, not only the reasonably disinfectant and wonderfully antiseptic qualities that have been so thoroughly tested, but that all-important one of non-interference with the recalcification of, at least, by far the larger portion of the decalcified dentine.

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[PART ELEVENTH.]

IT will thus be seen that with but partial consideration for pulp conservation and with large view to better cavity walls for the future, we are brought into direct thought and work for the maintenance of integrity of the filling.

Just in proportion, therefore, to the depth of the cavity, and, to the thinness of the stratum of decalcified dentine, I should regard it of importance that an *intermediate* should be placed first, and that the choice from our three intermediates should be restricted to temporary stopping and rubber varnish, and, that the latter should be used in conjunction with muslin, or, preferably, with disk of rubber dam—as suggested by Dr. How.

On the contrary, in proportion as the cavity is of moderate depth and the stratum of combined normal and decayed dentine which it is proposed to leave is of decided thickness, so I should regard it as indicated that the zinc-phosphate lining should be placed in immediate apposition with the cloves or cinnamon saturated dentine, that thus greater strength of lining and more assurance of future integrity of filling might be given.

The enunciation which placed Prof. Robert Arthur in the "Gallery of Heretics" was "I do affirm that in a vast majority of cases caries of the teeth remains stationary if the opening of the cavity of decay is well prepared and the cavity so filled as to exclude everything from it **ALTHOUGH DECAYED, DEAD AND DECOMPOSED BONE BE LEFT IN IT,**" and during the first ten years of my own experiments I examined a sufficient number of cases to warrant me in teaching this assertion as true. At first Prof. Arthur's enunciation was criticised as a loose and consequently unworthy assertion, and it was stated that the gradation of "decayed, dead and decomposed" proved this, as bone must be *dead* before it could *decay* and that it was more than useless to associate *decomposed* bone in this connection. But Prof. Arthur maintained his position and gradation by showing that the word *decayed* was used as it was universally applied to dentine, and that the decided pain incident to its removal positively proved that it was *not dead!*—also, that in making radically antagonistic affirmations it was *not useless* to make them the strongest possible, and it was to this end that he had gone so far as to leave *decomposed* bone to show that even that was rendered impotent provided "*the cavity was so filled as to exclude everything from it.*"

At this point, it seems to me, that we have another instance of the logical deductions which governed the progress of this work during the '70's and which placed it upon that basis where, since then, it has remained for those who have, during the past twenty years practiced it; thus it is shown *why* the gradual change from *pulp* consideration to *filling integrity* assurance, was a natural evolution, as, in no other way could this "*exclusion of everything*" be accomplished.

Is it needed that more should be said to show how vital to all this became "*The Choice of Proper Filling Material*" and thus to prove the continuity of our chain to this most important factor in the work of so filling teeth as best to *save* them.

There is, probably, no class of teeth, and no conditions of combined normality and abnormality that will better illustrate how very much more than is yet usually taught, or generally appreciated, is needed for the acceptable preparation and the permanent and *altogether satisfactory* filling of cavities of decay, than is this of the *nervo-bilious* temperament.

With the pearly, polished and resistant enamel, which, for these attributes, should be sedulously conserved, we have the highly organized and exquisitely sensitive dentine, that calls for care requiring the highest order of dental skill and *knowledge* for its treatment; and, with these apparently antagonistic tissue complications, we have to consider a systemic control, than which no other weighs, more accurately, everything in its delicate balance.

With all this, is it any wonder that its laterals are discolored, or that its bicuspids are "among the missing?"

And what a plume it is in the cap of dentistry that such treatment, and such choice of filling material as I have indicated can make for itself such a record as has been proven possible.

Next in gradation, and the last of the dentures which dentistry can rank as "good," we have the handsome, rich, cream-colored teeth of the nervo-sanguine, with their shapely edges and well developed cusps; their excellent enamel and dentine, and well planted in the jaw.

But in the usually circumscribed cavities of decay, we meet the equally usually exquisitely sensitive dentine, so in accord with all the other tissues, and equally with them, intolerant of infliction.

If there are any teeth whose successful care may be said to depend largely upon *judgment*, these are they.

But, most emphatically, it must be a judgment based upon much *knowledge*, for, while it is the nervo-bilious results of so-called "judgment" dentistry that has made it a by-word as to its inability to save teeth, it is the same kind of "judgment" dentistry that has, by its work on nervo-sanguine teeth, given it its horrid reputation for torture.

It is at this point, therefore, that I would urge a thorough knowledge of all that is known in connection with the treatment of sensitive dentine as the prelude to the preparation of the cavities in these teeth; and in addition to this I would add my voice to those I am glad to read of, in society reports, as urging the employment of soft gold in these cavities when gold, either alone or in "composite" work, is to be utilized.

It is with these teeth that *all infliction* should be specially

avoided, and it should be recognized that the term "inflictive" is applied as appropriate to dental manipulation "early in the fray!"

It is with these dentures, then, that napkins should largely take the place of rubber-dam; that the use of clamps is almost positively contra-indicated, for, it is with these teeth vastly more than with any others that "a knowledge of the presence of the tooth" is occasionally *never* lost after its having been clamped.

It is in these teeth that the difference between "hand-pressure" with soft foil, and "malleting," with either hand mallet, electric, pneumatic or automatic, with any form of cohesive gold, is most decided, and great preference for the former method expressed by patients; and it is especially with these that operations with plastic filling materials appeal most powerfully, and even regardless of every other consideration than that of exemption from pain during their introduction.

Thus it is that, from numerous considerations, the "choice of proper filling material" becomes here a most important matter, and one which is complicated almost, if not indeed positively, beyond that of any other class of teeth; it is here that "gold is an excellent filling material, if the necessary pressure is tolerated; if not tolerated, plastics are indicated," but it is here also, most absolutely, that the extreme æsthetics of plastic work should be utilized, in order that the equally extreme beauty of the denture should be maintained.

It is in this work that the beauty and gentleness of "composite" soft-foil work can be most notably utilized, for, with *properly made* oxy-chloride of zinc linings, and an equally *properly* introduced soft-foil gold filling, a beautiful, durable and delightfully acceptable result can be attained in any of the anterior teeth; while large or small cavities in the molars—lined or unlined, as indicated—can be as serviceably, and as acceptably, filled with an appropriate amalgam.

With considerations pertaining to the sanguo-lymphatic teeth we have reached that dividing line in the "choice of proper filling material" which seems to be a sort of boundary between gold work and plastic work, for, up to this point we have found gold to be the more or less proper material in the

varying degrees from "king of all filling materials," undisputed in its position of excellence, to its almost universal acceptance as the most useful, and the most beautiful, of all our materials, in its associate capacity.

But, from now, we shall find the utilization of gold becoming less in frequency until it *finally disappears entirely*; and yet, as it has remained, prominently, with us through six grades of tooth tissue, so it will be found, in diminishing degree, through three or four other grades before plastic filling materials will, in turn, become the "Rulers" of their special realms.

This difference between Kingly and Princely governance, is one of the special points which has always been taught by, and very seldom accredited to, the "New Departure."

In the very beginning, in the talk given for the "New-Departure Creed" in New York, November, 1877, it was stated by me, as its mouth-piece, "I do not wish to say anything to you of the teeth which you are in the habit of filling successfully, and, as we express it, satisfactorily, with gold; teeth of dense structure, whose cavities have walls so strong that you can impact a filling which lasts a lifetime."

Could any words be more definite than these? Could gold be accredited with anything more than ability to last a lifetime? And now, after all these more than twenty years, have I not placed it in *exactly* the same position?

But while we recognize the regal ability of the King we are also forced to acknowledge that his power does not extend beyond the confines of his kingdom; that he has accomplished practically nothing in his attempts to control beyond his domain; at the same time we are compelled to admit that there is no other King!—no other material which, in its realm, admits of *no discount*. While we are also thankful, very thankful, that we have amalgam, gutta-percha stopping and porcelain, with adjunctives which render eminently satisfactory work, with them, possible.

For the sanguo-lymphatic teeth, therefore, with their creamy gray color; their rather excessive size; their broad, shapely edges and cusps; and their fairly firm planting in the jaw; we find a fair, though not a strong, enamel; a fair dentine, and

thus a tooth structure in apposition with which, although gold fillings may often last fairly well, it will be found, clinically, that amalgams, in lined and unlined cavities, do seem especially indicated.

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[PART TWELFTH.]

NEXT in order for our consideration are the teeth of those whom we class as bilio-nervous; those individuals with less than average size; (always remember that *height* is not regarded) decidedly less than average osseous, muscular and contour development; with high and usually prominent cheek bones; with forehead broad in proportion to the rest of the face, and with small chin and jaws.

I speak rather especially of these temperamental diagnostics because we have now, probably, the most peculiar and trying teeth, of all the dental range, to deal with, and this not as regards any special dental tissue, but alike with all.

These teeth are variable in size and form, being sometimes broad, sometimes narrow, but with either, the necks are usually narrow and the cusps and cutting edges usually long and thin.

Though almost always fairly firmly set in the jaws—an attribute that may usually be regarded as an indication of enamel and dentine, above medium in structure—yet here we find this not to be relied upon, for both these tissues of the bilio-nervous teeth are generally so far from this as to permit, not infrequently, decided and extensive decay.

Again in the matter of sensitivity we will find this both excessive and not unduly acute; but, with either condition, that *perceptivity of pain*, which almost entirely precludes the possibility of anything like comfortable operating, and which demands the utilization of obtundents with most systematic gradation as to possible infliction.

It surely will be readily admitted that every concomitant associated with gold work, from the need of such a cavity preparation as all *know* to be *proper* for gold; on through the application of the rubber dam; the placing of clamps or ligatures; the length of time required for the introduction of the

filling; the impacts as piece after piece is welded and consolidated; the filing or disking, the pumicing and burnishing or other incidentals to finishing, all this is, in lesser or greater degree, not to be easily tolerated by the bilo-nervous patients and to some of them it is simply intolerable.

And yet—it is the temperament, *par excellence*, that *admires* the gold filling, while *experience* tells it that these fillings, as a rule, entail a too frequent renewal.

At this time, and in the face of the strong assertions on the part of even some of the Professors of Operative Dentistry, that gold fillings are more than equally capable with any for the saving of teeth, I shall not make other effort at opposing this teaching except to say that it does not at all agree with my extended observation and my 30 years of carefully tabulated statistics in this regard.

Here then we find a "debatable area" of intense interest alike to patient and operator; one which I think will be found well worthy of most careful study and of the most decided consideration—for with all this no sweeping success must be thought possible, but on the contrary, failure must be accepted as an occasional, if not more than occasional, result.

Just in proportion as these views are accepted as true, and their *meaning realized*, so will it be found necessary to inform oneself regarding the *minutiae* of filling teeth to a degree that has, until now, been unnecessary; for it is in this very "debatable area" that, for the very finest, most acceptable, most durable and altogether most *satisfactory* results, a combined amount of knowledge, judgment and skill will be required that can only be appreciated by those who are most proficient.

It is in this line of work that the progressive worker realizes and enjoys his constant progress, and, as well, his perception of evidently increasing capability; and it is here that he first *desires* to know of the varied attributes of the different materials he utilizes, in a way that until now he has never believed possible.

It is with these teeth, the peculiarities of which have given to their possessors an apparently unconquerable dread of dentistry, that the greatest triumphs of "non-inflictive" work are enjoyed alike by patient and operator, and that results are

accomplished which, with all the experience of the past twenty years, are yet viewed as incredible, and seem nothing less than marvelous.

Nor is it strange that this should be so, for upon this plane dentistry is, even today to the vast majority of its practitioners, an almost unknown art. It may well be admitted that I would not make such an assertion without the fullest warrant for doing so; and I think it cannot be denied that my opportunities for knowing this could not well have been greater; and it has been from this that I have striven to concentrate energy upon work that I regarded as purely *dental*, to the exclusion of wanderings in the paths of so-called "Stomatology." It is therefore in connection with the treatment and filling of cavities of decay in the bilio-nervous teeth that I shall insist upon the need for the most absolute knowledge possible, regarding *every attribute* of every dental medicament, method and appliance for the obtunding of local and general sensitivity; upon an equal knowledge of every attribute of every filling material and every adjunctive; and finally upon a reasonable degree of experience, and vastly more than a reasonable degree of manipulative skill in the utilization of all this knowledge as a *preliminary* to the expectation of any respectable realization of that which *can be done* with these troublesome dentures.

With all this knowledge and ability the meeting of indications begins to "take shape" and it is because of this being *but a beginning* that I have been careful to say that in this work "the progressive worker realizes and enjoys his constant progress" and I can now say that with thirty years of experience—from the early experimental utilizing of the oxy-chloride of zinc and the varying grades of gutta-percha stopping— together with the creasote, the deplorable arsenical paste and the inflictive deliquesced chloride of zinc as obtundents, all through the long line of improved filling materials and adjunctives, together with the numerous and acceptable medicaments and appliances for systemic sedation and local relief from pain which have been, from time to time, added to our list, it has been an uninterrupted advance toward an ideal which is most delightfully creditable—and yet the "perception of increasing capability" is the ever present incentive to better things.

That I may place this in some tangible form for a beginning I would say that for work upon anterior teeth it must be accepted that *unlined* cavities are practically *never* to be thought of; while even in the posterior teeth these are, as a rule, indicated—indeed I would say, that in proportion as I have *lined* the cavities of the bilio-nervous patients so have my results been generally satisfactory.

This brings the work of *lining* so far to the front as to leave only the preparation of the patient and the cavities as a prior consideration.

For this, from the systemic standpoint, the various allopathic, homeopathic and other remedies are so universally known and employed that such patients will frequently suggest that which is most acceptable, when the desired end to be attained is made known.

This, from a dental aspect, is not only admissible, but may be decidedly preferable, as it is almost universally better to encroach in minimum degree upon the domain of the general practitioner.

For the local obtundents I would suggest that the method known as “consecutive application” beginning with the mildest and positively non-inflictive remedies, and grading on in strength and efficiency until a satisfactory result has been accomplished and the cavity prepared as desired.

Does it need be mentioned that the very words “as desired” at once opens that discussion which will eventuate in every variety of procedure from that which might be eminently acceptable to that which might be quite the reverse; and with the diversity of opinion, and especially of *teaching*, regarding almost every phase of every dental operation, will it not be recognized that pitfalls beset the path of him who, as a beginner (in this difficult work) would essay to gain experience.

It is for this reason that I have found, as a *basal proposition*, that the *endeavor* should be directed to the abrogation of pain—or even of less than pain—that the aim should be to avoid even discomfort; and that this is to be done in no other ways than such as cannot by any possibility do more harm than good—as, for instance, an arsenical application for the removal of sensitivity of dentine, except when it is *not intended* to preserve the vitality of the pulp.

It is for such reasons that I insist upon exhaustive knowledge of everything in connection with each step taken, for it is not alone that evil may result from any given procedure, but with patients and with teeth, like these, it often becomes needful to decide between two goods as to which is the better, and again, as between two evils which is the lesser.

As I view it no slight degree of knowledge will suffice for this; and experience teaches us that great proficiency is sometimes insufficient to accomplish all one would desire.

I desire, extremely, that it may present itself to my readers as it does to me, that if there be any *special portion* of the long battle ground upon which is fought the variance of opinions and procedures of "Operative Dentistry" we are on it now.

There is no one step, from the incipiency to the final completion of any work upon bilio-nervous teeth, for which teachings and practice are more dimetrically antagonistic than any other; and, while it is true that this condition of things pertains in extraordinary degree throughout, it is yet, as it seems to me, no where else so *positively decided* as here.

Thus it is, that it is not sufficient for me now to say that for the cavities of decay in such teeth certain specified materials are indicated as "proper" for filling them, but that it should be made clear that the *preliminaries* to their using should be shown to have that immense importance in deciding the final results which it is impossible to over-estimate.

And so it is, again, that in the very beginning of work the question as to the using of rubber-dam or napkins presents itself.

This would be answered by *most*, I believe, *at present*, in deciding for the rubber-dam; while others, now the *few*, would equally promptly decide for napkins.

For *myself* I should say that with the decision for rubber-dam would *probably* be associated successive discomforts (not to say inflictions), which would be pronounced "unavoidable" or "necessary" as would be said of the placing, ligating or clamping of the rubber, while the truth would be that most, if not all of these, would be neither unavoidable, necessary, or other than needless, and even objectionable.

As regards the *use* of napkins it is only to say that it is their

abuse far more than their use which is now indulged in, and that to this should be directed an earnest effort toward reform.

It is sufficient to read instructions in this art as given in "The American Text-Book of Operative Dentistry," pp. 164-165, where directions regarding size, shape and applying are glibly tossed off in four paragraphs!

And this is "The Text-Book!"

Napkins should *not* be of either the size or shape as there given; the manner of folding is utterly wrong; the method of handling and placing is just the reverse from what it ought to be—and yet there is one sentence strictly true—viz.: "Here the reliance is upon napkins and with them much skill may be displayed by *deft* operators."

This assertion is surely beyond dispute, and this is the reason *why*, in connection with work upon the bilio-nervous teeth, the "*deft*" napkiner would decidedly prefer napkins to rubber.

It was the discussion of successive points in this connection that from the attendance, the manifest interest, the almost endless interrogating, the clinical testing and the testimony after graduation, has impressed me as the culmination of value in my combined course of lectures on Dental Pathology and Therapeutics and Plastics and Plastic Work, and I now realize, as I have never done before, the need for long and careful preparation of the soil, before such sowing of seed as shall yield a compensating return of *ability to practice a non-infictive, tooth-saving dentistry.*

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[PART THIRTEENTH.]

I have said that at this point in my contributions I am impressed, as I have never been in lecture courses, of the need for long educative preparation of the student, to the end that the practice of a non-infictive, tooth saving dentistry may be a possibility.

This, I now recognize, has been due to the *combined* pathologic and therapeutic teaching as associated with that portion of operative dentistry included under "Plastics and Plastic Filling."

In this work, I left to the Chairs of Physiology and Bacteriology the *minute* discussion and demonstration of these

subjects, and confined myself to a concise teaching of those salient points which are regarded as *conditions admitted* in connection with any and all *theories* and which, as I view it, sufficiently educate to diagnose relative phases of special dental perversions from normality, and to intelligently "meet the indications."

If it be granted that, with the physiological teachings regarding digestion and renewal and aeration of blood, there is given a sufficiently tangible basis for normal nutrition, and that microscopic observation will show such characteristics as may reasonably be regarded as *nearly* normal capillary circulation, while slight irritation, by any form of irritant, can be *seen* to produce that change in the circulation which would indicate that slight deviation from normality which is so well defined by the phrase "*a determination* of blood to a part," I have come to regard *this* as the best presentation for a practical conception of those consecutive deviations from normal that eventuate in conditions known as truly inflammatory, and which, if not overcome, pass on to those serious complications which, for our present purpose, may be grouped as pus formation, gangrene, caries and necrosis.

I have felt that as physiology, even with its ever changing theories, gives *us* an ever present basis for *health*, so the microscope, in its simplest utilizing gives *us* an ever present basis for the practical recognition of *disease*; and that, for its general acceptance, and greatest usefulness, the less this is clouded by complicated theories, as these are discarded and promulgated, the better for both practitioner and patient.

Upon such foundation I have constructed and taught for many years what I have termed "*visual pathology*," dividing it, from normal to death, into four parts, according to old nomenclature, viz., "*determination*," "*congestion*," "*inflammation*" and "*resolution*," or "*suppuration*" with their concomitants.

I have continued, from year to year, on this line because I could really see no reason for change, and I think I have, by this consecutive treatment of these varied perversions from normal nutrition, given to the minds of students a better mental vision of the conditions they would be called to treat than I could have done in any other way.

It may possibly be recognized that in connection with all the discussion of the signs, symptoms and *results* of each phase of altered circulation, constant reference would be made to the varying special requirements, appliances, medication and instrumentation demanded by dentistry, and it is this voluminous "preparation" that I feel the want of now, for, just in proportion as we leave the strong teeth, with their resisting and enduring temperamental attributes, the utilization of gold, in large degree as a "proper" filling material, with its adjunctives of rubber-dam, mallets, disks, finishing burs and long sittings, all of which are needed for the accomplishing of beautiful and durable work, so we are brought into contact with all those conditions which make "plastic work" as entirely different from "gold work" as any two departments of any special calling can possibly be.

It is for this reason that the consideration of *moisture* is the very *first* indication of this decided difference:

Dryness, long continued, perfect dryness, is a condition the value of which in connection with gold work cannot be over-estimated. It can truly be regarded as an essential.

I do not know of that demand in connection with plastic work that calls for any special dryness (absence of breath moisture) or for any long continuation of even moderate dryness, *except* in the filling of a discolored tooth which has by any of the various methods been more or less perfectly restored in color.

In a practice of almost twenty years devoted *exclusively* to the treating and filling of teeth *below medium* in structure, and for which work no other than plastic filling materials were employed, I *never* used the rubber dam except in the very infrequent cases I have noted.

But when, in the use of napkins or properly secured cottonoid rolls, I claim an all sufficiency, and a *more acceptable* means for maintaining the required dryness for plastic filling, I do not accept any other than the regular systematic "6 napkinings" with the double folded, long, narrow napkins (2½ inches by 14 inches) such as have been used, with gradual modifications, ever since the time of that very "deft" napkiner, Elisha Townsend.

The *second series* of indications are grouped under that long line of considerations pertaining to such modifications as are presented by temperamental governance in the increase of sensitivity; increase of weakness of tissues; increase of doubts as to eventual success, and increase of constant thoughtfulness for, and appreciation of, *this* combination of complications.

On the other hand, we have, as we pass on in the downward gradation of the various dentures, that decrease of sensitivity which is so treacherously conducive to irreparable injury of pulps; that decrease of energy which almost entirely precludes response to therapeutic efforts, and that remarkable decrease of everything upon which to build, *except* the equally remarkable *possibilities* of dentistry, *provided* that all *this* combination of complications is, if it may be, even more fully appreciated, and most capably provided against.

We have then first to regard *non-infliction* as of prime importance, and to recognize, to the full, that the term "thoroughness" as applied to dental manipulation, is thoroughly indefinite, and that it does *not* mean, truly, anything less than work done *exactly as one would desire it to be done for oneself*.

This covers the ground *accurately* for each practitioner, for, just what each dentist would *desire* should be done for himself to a tooth *in like condition* with the one which he is operating upon, is just what should be done *by him*; and if he cannot do it, he should not say, or even think, that it is *impossible*, or, that it is *necessary*, or that it is *best* to do otherwise, but at least should acknowledge to himself, and better yet, to the patient, that he *does not know how*—and then try to learn.

*As I have experienced it*, and as I have taught it, this has seemed to me the basis for solid dental education, and the only basis upon which, from the bilio-nervous on through to the soft and almost hopelessly worthless teeth of the nervo-lymphatic temperament, any eventual average of "proper choice of filling material" can be taught.

And so it is that here we largely leave *much* thought of gold, and enter the special range of the different amalgams and the adjunctives of oxy-chloride of zinc and zinc-phosphate cements.

And yet again it is here that we find that front-tooth work

of oxy-chloride "lining" and *soft foil* gold filling which has made most notable and most acceptable results during the past fifteen (and, in limited degree, twenty) years.

In this work the thin lining of the oxy-chloride should be pelleted into position—see "Plastics," p. 193—and covered with temporary stopping, which should be allowed to remain for at least twenty-four hours, and preferably, three or four days.

If then the filling of gold be introduced in the usual "piece to piece" manner, it should be done with extra gentleness and care, not to fracture the lining, and with thought for the gentlest utilization of all objectionable appliances. But it is here, probably more markedly than at any other place in the whole range of gold work, that the advantage of soft foil work is made apparent to the *patient*, and, from its comfortable possibilities, as well to the practitioner.

The steady, gentle pressure in the introduction of the first "cylinders," the gradual filling of the cavity with appropriately placed and semi-condensed "pellets" and "tacks," and the final single-point subsequent condensation of the filling as an entirety, is a manipulation which, to those of us to whom it is familiar, is the source of never-ending amazement—and I may venture to say amusement!—as we view the ordinary cavity filling, and even the contouring work, as taught at the present time.

In connection with the gold work in filling the "lined" cavities of the nervo-bilious front teeth, as well as in the napkinings pertaining to the same, I must maintain that a return to the methods of forty years ago would be a decided *advance*, and I write in the hope that all the seed sowed may not fall upon "stony ground!"

Next in order are the composite fillings of oxy-chloride and amalgams, and for these we have the first modification, in practice, of *immediate filling*, for a good oxy-chloride, properly worked, should "set" sufficiently in fifteen minutes, to permit the introduction of an amalgam filling.

For these fillings we have, *first*, those amalgams made from so-called "white alloys," which, however, for this work, should be "tested" by immersion in a solution of sulphide of

potassium (ten or fifteen grains to the ounce of water) to be reasonably sure that their amalgam will keep its color, which it should do for ten days or two weeks.

*Second*—We have those combination amalgams made by mixing “facing” and “contour” alloys in varying proportions, usually equal parts; or, for greater strength, if needed, one part “facing” two parts “contour;” these amalgams should be, preferably, made by accurate weighing of mercury and alloy, with alloy *down* for all the mercury will make into the least plastic (and yet *plastic*) mass.

It appears, from testing, that the more accurately this is done the better the result so far as maintenance of color is concerned, while, with just the right degree of plasticity for working without expressing any mercury, all other attributes are at their best.

*Third*—We have any good “contour” amalgam, which, in cavities that are not directly exposed to view, has been my reliance for this work for twenty years, and for which no other amalgam has made, for me, an equal record. In these cases I always finish the fillings with a *burnish*, for, while I leave other fillings of this kind in front teeth, with pumiced faces, for the greater whiteness, until some discoloration may demand their brightening and burnishing, I deem it better to burnish when not contra-indicated and thus secure the most positively permanent finish.

*Fourth*—We are now having the trial work upon the third line of amalgams made from either four or five metal alloys into which both copper and zinc enter, either as distinct components, or as some one of the various compounds known as “brass.”

The first work of this kind that I know of, I inaugurated about fourteen years ago—see “Plastics,” p. 104 b—as a result of four years of experiments upon two lines of “front tooth” amalgams, neither of which proved satisfactory, though both *promised* well for several years and finally gave the idea of making an alloy, in which the then strange incorporation of both copper and zinc should occur.

I do not know of any other line of work in amalgams that promised so much, and eventually so disappointed the expecta-

tions, except the dreadful *cadmium* amalgam, which was more than disappointing, as in its dentine staining and its pulp devitalizing record it was fearful.

But, as in the cases of their predecessors, the five metal alloys, beside being very expensive (costing nearly \$3.00 per ounce to make), gave evidences of unreliability in the several directions of edge-crevicing, discoloring, pitting and the *peculiar corroding* which had been first noticed in the earlier, heavily copper, front-tooth amalgams.

Having indulged in "bronzes" (copper and tin alloys) in connection with sub-marine alloys it was an outgrowth of that work that the apparently disintegrating work of the antagonistic (so regarded) copper and zinc might be modified by their union in the form of brass, while the constant incentive to this work was the attribute of "quick-setting" in a degree far greater than pertained to any other class of amalgams.

This gave, for me, the division of these alloys into two classes which I named "bastard" as made by the utilizing of the two metals as such, and "brass" as made by having this for a distinguishing component.

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#### [PART FOURTEEN.]

SINCE 1886 work has been going on in connection with these peculiar alloys, as it was, and is yet, of much interest in just this filling of cavities of decay in such positions, and with such "composite" work, in teeth of the bilio-nervous, sanguo-nervous, lymphatico-nervous, bilio-lymphatic and nervo-lymphatic temperaments; but it has been with much disappointment as to results and with never ceasing *suspicion* as to the "eventual" of these curious combinations.

It is for these reasons that I have always taught that they should be used *only* in "lined" cavities, and it is because of their unique attribute of *quick setting*, that this lining is better made of oxy-chloride, and, as one becomes the more familiar with both oxy-chloride and zinc-phosphate lining work, this teaching will be the more appreciated. And in this connection I would again urge the advantage of the oxy-

chloride lining in these *front* teeth, from the fact that its general reputation as associated with pulp devitalizing irritation is better than that of zinc-phosphate, which, though not positively proven detrimental, is nevertheless largely discredited, and in connection with which I have always *advised* giving any approach to pulp the benefit of every doubt, and the invariable use of either temporary stopping or *rubber* varnish (see *Plastics*, p. 171), as an "intermediate."

In connection with the use of any of these "brass" or "bastard" alloy amalgams I would have it understood that this attribute of "quick-setting" is the *only* one about which *much* is known.

This is a positively placed matter for a properly mixed "brass" amalgam will "set" nicely in from five to ten minutes, and should be hard enough to receive a fine burnish in from twenty to thirty minutes at most.

The next attribute about which *something* is known is its maintenance of color. This is quite "undetermined," for it is sometimes very good, but again sometimes not good, but with this, as with all amalgams, a fairly good result may be usually attained by carefully smoothing and burnishing.

Beyond this, so far as I know with all my years of experience in this work, *nothing is known* as to the eventualities of these amalgams. That there has been a gradual gain in "maintenance of integrity" I do know, but that this is yet, in much degree, to be compared with that of the three metal alloy amalgams I have no reason to believe, for the same corrosive disintegration that came comparatively early in the "buttons" and in the fillings made from the "front-tooth" amalgams of from 1888 to 1890 yet continues in the experimental buttons even of the four metal alloy amalgams of the past six or eight years, and indeed in the most recent samples of my own, and other, amalgams of this class.

This "corrosive disintegration" is, with the exception of the "heating," the "swelling up" and the "crumbling into dark powder" of the trial aluminum amalgams, the most curious of all my amalgam experiences, and although, as I have said, its occurrence is greatly delayed in the most recent "brass" testings, it is yet sufficiently in evidence to warrant continued

use of every precaution against unsatisfactory results, as the *brown, crumbly debris* which has dropped from the various "test buttons" of the last two or three years is a most noteworthy object lesson as contrasted with the satisfactory maintenance of integrity of the "test buttons" made from *any* of the three metal alloy amalgams. And now as we proceed, meeting the peculiarly varied decay of the sanguo-nervous teeth "either limited and circumscribed or almost unlimited and extended" we advance even more decidedly into the domain of "Plastic" filling materials, and yet because of these duplex attributes I have practically divided the "choice of proper filling material" into two great divisions and assigned gold to the accessible, circumscribed, oxy-chloride of zinc *lined* cavities, more especially in the anterior teeth, and amalgam to the less accessible cavities of extended decay in bicuspid and molars using "composite," or "combination" work, or appropriate sub-marine amalgams in *unlined* cavities as indicated.

In these ways the beautiful, shapely, bluish-cream colored teeth of this temperament are most acceptably, most durably and most satisfactorily filled in such wise as to secure, during the passing of the years, an increasing appreciation of this comparatively permanent dental service given to perceptions which are always acute, repeatedly hopeful, and yet (as we know) based upon a foundation that is, naturally, without endurance or strength.

With a step both sudden and decided we now pass to the teeth of the lymphatic-nervous patients; those persons of quite average size, but with less than average osseous and muscular development, and yet with more than average contour tissue.

These grayish-blue teeth, of average size and shapely, though fairly planted in the jaw, will be found soft in both enamel and dentine, prone to rapid and recurrent decay and with pulps liable to irritation and indisposed toward any recuperative or self-protective effort.

It is with these that discussion as to pulp conservation seems a mere waste of words, while pulp-capping is a work absolutely contra-indicated; with exposed pulps in connection with such teeth I have, long since, been directed by experi-

ence to devitalize at once, while in *deep* decay I should treat with all the care given to exposed, or nearly exposed, pulps in warrantable cases, using not only *porous* cappers (oxy-sulphate or plaster of paris) together with appropriate antiseptic medicaments, such as acetate of morphia and oil of cinnamon or oil of cloves paste, or a pad of inspissated canal paste, and in conjunction with these either rubber varnish on rubber disk, or a thin disk of slightly warmed temporary stopping; and all this with the full recognition that pulp conservation was doubtful and with the filling work in comport with such recognition.

It would therefore ensue that as a first consideration regarding filling material it should be decided what relation the existing cavity of decay, and the manner and materials in which, and with which, it was filled, would bear to any future demands arising from possible pulp complications.

Thus it would be that if in such event the present filling would not be disturbed, as its removal would neither facilitate devitalizing applications to pulp nor favor direct access to canals and consequent complete extirpation, such filling should be made with methods and materials such as have already been directed for permanent work in the teeth "below medium in structure."

If, however, in view of future trouble it is decided that applications and ingress to pulp cavity and canals would be best made by removal of filling we are at once brought into contact with all those varied devices that the experience of the past twenty-five years has proven advantageously possible in the utilization of plastic materials, for these *only* have been found equal to this emergency.

It is at this point in our discussion that we find ourselves not only in the domain of "plastics" but with the practical recognition that in order to accomplish the best known results it is needful that these be used under the direction of the most thorough knowledge as to their attributes and the methods of their using.

In the "Flagg-Inglis, Questions and Answers," p. 45, under the lymphatico-nervous "Considerations pertaining to filling" will be found "Use plastics with great care," but these five

words represent a needed volume of instruction *both didactic and technical*, and it is this *fact* which is clogging the progress of operative dentistry in this regard to an incredible degree.

From the Chairs of Operative Dentistry but little instruction is given regarding amalgams (the most important of all the plastics) while for gutta-percha stopping and the adjunctive plastics, oxy-chloride of zinc, zinc-phosphate, zinc-sulphate and temporary stopping, vitally important, as each is in its *proper place*, and with *proper manipulation from first to last*, and with the need for daily, and sometimes frequent daily utilization, all these, and this work, receives not so much attention as is given from the Prosthetic Chair to the softening of beeswax and the mixing of plaster of paris.

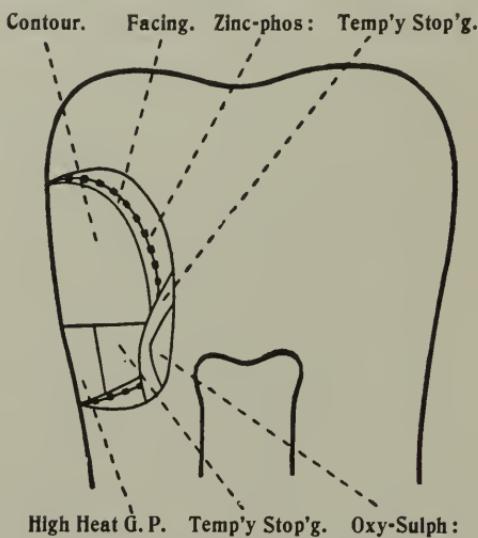
And the result of this is the very careful and most accurate manipulation of the latter, *failures with which can be remedied by other attempts*, while with the former, a supposed capability as to efforts with methods and means of easy acquirement, will eventuate in disappointments, failures and results impossible to remedy, all of which are ascribed to everything *except the real cause*.

It is a comfort to me to *know* there are *hundreds* who realize thoroughly the truth of every word of this that I have written, but it is a great trial to know that there are *thousands* who have not the least idea that this is so. My intimate and long association with the using, making, teaching and clinically demonstrating all this, gives me the desire and the power to write of it, for, knowing it thus, the telling of it becomes both a pleasure and a duty.

And so it is that while the filling of the cavity which is intended as a permanent work would usually require only one or two materials, and never more than three, the filling of a cavity from which the removal of the filling, either entirely or partially, would be more or less indicated, could *never* be done with less than three materials, and for the nicest and most thorough work four, five and even six of these would be required.

It was by this kind of work and this kind of teaching that I have made the record which I hold; and by this that I have

been able to save, comfortably, economically and *almost* universally, the teeth of these very trying dentures.



Case: Large cavity on buccal face of lower molar—pulp irritated—soothe pulp, with campho-phenique, gently remove debris and cleanse with tepid water, excavate carefully, obtunding if necessary cervically and morsally, leaving decayed (decalcified) dentine toward pulp, proven vital by sensitivity; disinfect and antisept this by oil of cloves or oil of cinnamon; dry gently with bibulous paper; mix pad of oxy-sulphate of zinc and place near pulp by pushing from end of pointed spatula with a fine probe—see "Plastics," p. 160—let "set," ten or fifteen minutes; cover with disk of slightly warmed temporary stopping, making this adhere to cavity walls by gentle pressure; place on slab the fluid and powder for a zinc-phosphate mix, and then make button of Facing amalgam; hold this in palm of hand and make zinc-phosphate mix; place on cavity walls and combine Facing amalgam with it, working them to feather edge at mouth of cavity and leaving exposed face of temporary stopping at bottom of cavity; when sufficiently set (four or five minutes) make solid cylinder of temporary stopping, of the diameter of exposed face of stopping; warm this to flexibility and place it so it will adhere to the

disk of stopping and rest against the cervical part of the facing amalgam with its combination feather edge; the end of this cylinder should protrude a little beyond the edge of the cavity and the space above it is then filled with Contour amalgam cold-soldered to the combined Facing amalgam; if properly mulled and, possibly, slightly wafered, the Contour should set in twenty minutes sufficiently to permit of the cutting off of the protruding stopping with a warmed instrument (number 3 of the amalgam set) flush with the face of the filling. It is unnecessary to do anything more to this filling immediately, and I prefer that it should be given *time*, according to the exigencies, for the pulp to determine *something* for itself.

If needful, however, the work can be finished as soon as the Contour amalgam is thoroughly set—in a half day or even less—by removing some of the outer portion of the cylinder with a warm instrument (number 5 of the amalgam set) and replacing it with a covering of “high heat” gutta-percha stopping.

This makes of the work a permanent filling, giving ample opportunity for any future pulp demonstrations which, in these teeth, according to my experience, requires from three to five years at least.

With a moderately careful study, it will be seen that every indication of every step in this work is accurately met in such wise as could not be done in any other way; and as well that from the best to the worst of the future possibilities, everything is provided for so that should trouble come it can be relieved or removed with the least possible infliction to the patient and with the greatest possible ease to the operator.

To those who would be inclined to view such work as this askance I would say that I am merely telling how I have done it and how I have taught it, and that, as in our California vernacular we would put it, it has made “the claim pay.”

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[PART FIFTEEN]

I HAVE said that with a moderately careful study it would be seen that every indication of every step in the compound filling diagramed is accurately met in such wise as could

not be done in any other way, and it is for us now to give that study.

The tooth is one of a patient of lymphatico-nervous temperament; the cavity a large one on the buccal face of a lower molar; a very deep cavity and *with an irritated pulp*.

In the Flagg-Inglis *resume* p. 44, under Vital Force, it is said "But little vitality is possessed by this temperament to give support to treatment," therefore, in recognition of this, every supporting consideration should be carefully included in the treatment.

It is stated, "If exposed pulp, devitalize; in deep decay treat as for exposed pulp of lymphatico-sanguine; success doubtful." Then under lymphatico-sanguine, p. 40, we find under Conservation of Pulp "Apply soothing, constringing and porous cappers (oxy-sulphate or plaster of Paris) if nearly or quite exposed; in deep decay apply intermediates."

Therefore, it is that having prepared the cavity for filling, the first recognition is that gentle effusion is the early result of irritation in such a soft tissue pulp as this one; that with the removal of cause for irritation by exclusion of external irritants this effusion will gradually cease—but that this cessation will be *gradual*—and that if an impervious barrier is placed in its way the slight effusion will soon become, in turn, an irritant which the "little vitality" would be unable to vanquish.

In oxy-sulphate of zinc we have not only a porous or pernicious barrier but the happy combination of a gently constringing medicament by means of which the indications seem most fully met.

But now this very porosity must be regarded as permissive of being occupied by any other fluid as well as that of effusion, and it is therefore imperative that an "intermediate" shall be so placed as that this porosity will subserve its purpose.

For this, of our three intermediates the temporary stopping best subserves the present purpose from its various attributes of ease of placing with very moderate warmth; absolute absence of any moisture (as with varnish) and ease of perforation or removal in case of subsequent need for either.

Having done thus much for the protection and preservation

of the pulp, the next consideration is toward the making of a substantial, tooth-conserving filling, and yet one which shall combine with this the peculiarities of maintenance of integrity, should that prove to be the object desired, *and yet* the possibly even more important attributes of facility for giving relief by medication in the event—"success doubtful"—of future suffering, or, even the more remote trouble, from eventual death and putrescence of pulp, necessitating free opening into pulp cavity and easy access to pulp canals.

With all this in view the stratum of temporary stopping is extended cervically and having thus practically precluded any undue effect from the phosphoric acid of the zinc-phosphate cement, arrangements are made for the introduction of a *thin* "combination lining" of this cement and "facing" amalgam, which is now made.

When this has partially set that portion of it which covers the *approach* to the pulp cavity is carefully removed to the temporary stopping and a cylinder of temporary stopping is made, *slightly* warmed and placed in position at the cervical edge of the cavity in such wise as to protrude a little beyond the edge.

A permanent contour amalgam filling is then made around the temporary stopping cylinder, trimming the filling into shape and leaving it *unfinished* until it is sufficiently set to permit of the trimming off of the protruding end of cylinder with No. 3 heated, when, unless otherwise indicated, the work may be left for a week or two or more until a reasonable length of time shall give evidence of a present success.

If in the near future the desired promise is given, the amalgam should be *finished* and the external portion of the cylinder is removed with No. 5 heated, and its place filled with high heat G. P. thus making a permanent filling.

And now, if in the course of time symptoms of recurrent pulp irritation are given, and are of sufficient magnitude to require relief, this can readily be given without the least infliction by gently burring out the high heat G. P., removing the temporary stopping by slightly warmed instrument, and making the soothing applications of campho-phenique, acetate of

morpia paste or other preferred medicament, which soothing is to be followed by devitalization of the pulp.

And again, if years pass by, two, three or five, and eventually signs of periodental irritation which are diagnosed as due to probable pulp putrescence, the same removal of readily removed filling material opens the way to easy drill entrance into pulp cavity and almost immediate subsequent comfort, but, with the recognition that at least the treatment for third-grade periodontitis should be indulged in prior to further mechanical irritation from largely "opening up."

And when it is found that the free opening into pulp cavity is tolerated, there is nothing to remove except the thin stratum of zinc phosphate and *facing* amalgam lining, when easy access to cavity and canals is afforded.

I have been thus minute in describing such work as I have done many hundreds of times because it is just here that the line of demarcation is drawn between the elegant results of such work as I have given in the earliest of these papers, and the almost incredibly acceptable results of the best of plastic work.

And this dividing line is one which cannot be overstepped in either way; the work is different; the materials are different; the instruments and appliances are different; the knowledge needed is different and the results are different; but each is, in its way, the best, *the very best* that can be done.

It is for such work as this that I have so earnestly championed "Plastics," and it has been to secure recognition of this that I have taught and demonstrated as I have, and that I now write in the hope, and with the belief, that much good may come of it.

We now come to that portion of the dento-temperamental classes which is included in the 4th division; those teeth whose every attribute is graded as "Positively bad" and, beginning with the *bilio-lymphatic* as the better of the two we find the individuals of decidedly more than average size with largeness of development but with neither beauty of form nor strength of structure.

We find teeth yellowish in color; of good polish, but of

suspicious opacity; large and bulky; almost worthless; loosely planted in the jaw and subject to extended, asthenic decay.

Individually and dentally we have a vital force far below average, and under the feeble dominance of which comparatively slight irritation *may* produce serious lesions.

Experience has, for many years, taught me that *plastics only* can subserve any good purpose in the filling of such teeth; that these must be used with the most possible knowledge regarding their quality and their attributes, and the methods of, and appliances for, their proper manipulation; and, with all this, that the frequent repairing and renewing of fillings must be anticipated and that, again, even with this, these teeth will be found very hard to save.

And it is the apparent efforts to do, that are frequently most misleading, giving hopes that are never realized, and indeed the semblance of assurances that are utterly unreliable, for the great sub-stratum of all effort as associated with the bilio-lymphatic temperament is "weakness trying to be strong; vacillation trying to be decided; softness trying to be solid, and inertia trying to be momentum."

It is then in the filling of a large proportion of the cavities in such teeth that our reliance is found in gutta percha stopping, and not infrequently in the ordinary *red* gutta percha base plate, that material which in the earlier days so well sub-served its tooth-saving purpose (as the previous reliance—Hill's stopping—gradually deteriorated until it became almost worthless) as to have caused me to say of it in the first edition of "Plastics" p. 143 that it was "very useful and *eminently serviceable*."

I desire that it shall here be noted that in our serial we have passed gradually and systematically from *all gold* to that point, which we have now reached, of *all gutta percha*, and that as gold is decidedly the *best* material with which to fill the teeth of the *first* class, so gutta percha is equally decidedly the *best* material with which to fill such cavities in teeth of this *fourth* class as are so situated as that the filling will not be subjected to undue attrition, and that just in proportion as these fillings are exempt from attrition so they will prove the most *permanently* tooth-saving of any that can be introduced.

With all the added experience of another twenty years I cannot more strongly accentuate the value of this filling material than I did in 1877. I had just then finished the most arduous and most careful line of experimental work that I ever undertook for dentistry.

I had striven to follow, for eight years, *two thousand* tabulated fillings of gutta percha in *soft* teeth, and I had accomplished this *almost* positively; during these eight years I had found but *eight per cent.* of failures, while in hundreds of these cavities, well introduced gold fillings, had failed almost universally in from two to five years.

It was because of this work and of these positive results that I then felt able to take the stand I did and from that time to this the "provings" of gutta percha work have only corroborated the truth of the teaching.

Of all the enunciations of the "New Departure Creed" no others have been viewed as so utterly absurd as the Articles VI, VII and VIII, while the truth is that none of the ten articles were more carefully considered or more thoroughly discussed than were these three; and it is just here, in our discussion of the "Choice of Proper Filling Material," that an experience of thirty years of my long practice devoted almost exclusively to the *soft* and *softest* teeth, teaches me that I must build my structure entirely upon these three articles.

"Article VI. A filling may be the *best known* for the tooth and yet *leak badly*."

It was not known until the work of the "N. D. Corps" proved it, that gutta percha fillings were leaky—and, at that time, when I asked from the members of the "Odontographic Society of Pennsylvania" an opinion as to "With what filling material the least leaky filling could be made with the *greatest ease*" it was agreed, without one dissenting voice, that gutta percha was that material, while the *fact* is that even with the *greatest care* a gutta percha filling leaks badly.

This attribute of gutta percha stopping is attributed to "inconsiderate manipulation" on p. 246 of "The Text-Book of Operative Dentistry" but the entire chapter from p. 219 to p. 257 is such a collection of palpable error that I regard it as unworthy any consideration, while the fact of wonderfully

long duration of fillings so introduced seems to indicate a manipulation not so very inconsiderate.

It was, therefore, because of the experimental showing of the extraordinary tooth-saving ability of these fillings and, as well, their equally demonstrated decided leakage, that Article VI was incorporated in the "N. D. Creed."

"Article VII. Gutta Percha *properly used* is the *most permanent* filling material we possess."

From the same careful consideration and thorough discussion this was made one "Article" of the Creed, and it is in this connection that it becomes important it should be clearly understood, for if it is, under any circumstances, the most permanent filling material we possess, it surely should be distinctly decided what those conditions are, and this is decided by the two italicized words "properly used."

It is readily admitted that gutta percha stopping is a reasonably permanent filling material in numerous instances, but in many of these it is used under such limitations as to render it far less *permanent* than would be other materials, which again have attributes more objectionable than is the one of lesser permanence.

In such cases gutta percha cannot be said to be used in an italicized *properly* manner, for it has serious discount, but for some cavities of such teeth as pertain to the bilio-lymphatic temperament there is *no other* material so well adapted as is gutta percha.

These are such cavities as will permit little or no attrition to wear upon the filling, and these are *proper* cavities in proportion as they will permit *no attrition*; but while in these the *employment* of gutta percha is strictly proper, it *may be*, and to an enormous extent it *is*, that it is not at all "properly used."

I know of no other *filling* material which so suffers misuse at the hands of recognized "good operators" as does gutta percha stopping; from the selection of the material; the heating of it for introduction; the instruments and condition of instruments for the purpose of its insertion, and finally for the finishing of the fillings; all is *usually* as unlike what it should be as it well can be; and it is from this that the *permanence* of

gutta percha fillings is doubted, and that its position as "most permanent," under any conditions, is scoffed at.

The first consideration, then, in connection with the "proper use" of gutta percha as a filling material is the selection of a good "stopping," and unless this is done it is *useless* to proceed further in the direction of permanence.

The two "tests" for quality of G. P. S. are so easy to make and so almost positively conclusive that I regard it as absolutely necessary they should be familiar to any who desire to do the best that can be done in G. P. work.

These tests are the "Heat Test" and the "Fire Test" and both are so important and so decisive that I will say at once it is better to have the combined G. P. and instrument warmer for the first, as it is an *essential* in the doing of G. P. filling, and is sufficiently accurate for all practical purposes, as when "low-heat G. P." or red G. P. base plate are put on the upper plate; "high-heat" or shaded G. P. on middle plate; and instruments, on lower plate, the heat for instruments, the handles being comfortable to work with (and this regulated by raising or lowering the lamp wick) all heats are right.

If when this heat of instruments is acceptable the "high-heat G. P." is more than sufficiently soft, it is not up to grade, either from poor quality of G. P. or insufficiency of inorganic admixture; while if it is then not perfectly plastic it is possible that this may be due to being "saturated with zinc oxide," a condition which renders the G. P. S. practically good for nothing.

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[PART SIXTEENTH]

HAVING thus by the "Heat Test" settled the question as to the proper grades of G. P. S. it then becomes needful that the relativity of proportion of gutta-percha and inorganic admixture shall be decided, because upon this equally rests the ability of the G. P. S. to do "permanent" work.

For this we have the "Fire Test;" this is easily and conveniently made by weighing a small quantity—say ten or twelve grains—preferably in one piece. This is then subjected

to high heat by being placed upon a long-handled iron spoon and this held in the flame of a Bunsen burner or put on a hot fire; in a few minutes it takes fire; burns with a bright blaze; ceases to burn; becomes red hot and thoroughly calcined, while it perfectly retains its original shape. If ten grains of G. P. S. has been thus treated, the residuum should weigh about seven grains if the G. P. S. has been graded, by the heat test, as of "low-heat." If the ten grains is of "high-heat" the residuum should weigh eight and one-half grains, or a trifle less; (one G. P. to six inorganics).

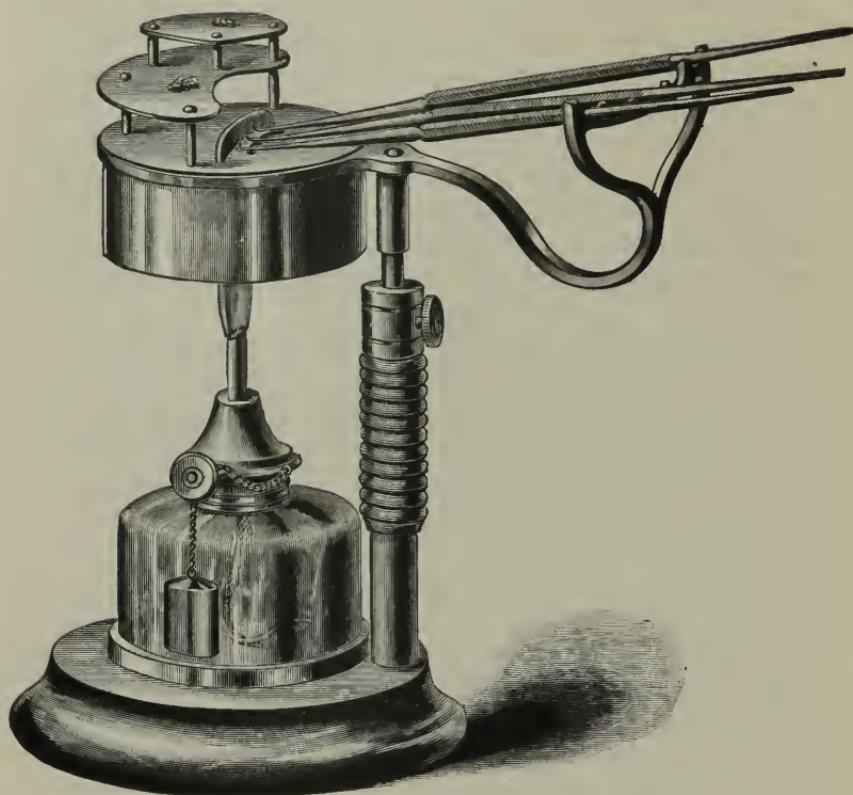
If the residuum weighs nine grains that stamps the G. P. as unreliable (one G. P. to nine inorganics) as it indicates "saturation with zinc oxide." It may seem strange that so little difference in weight of residuum should make the great difference between "excellent" and "almost worthless" but this it is which has taken *many years* to work up and to *demonstrate*, and this certainly has been done.

*And it is well worth knowing.*

Having thus settled the *quality* of the G. P. S. it is next essential that it be "properly used." I have already referred to the G. P. and instrument warmer as a means for testing the grade and quality of gutta-percha stopping, though there are other ways of doing this even more accurately—see "Plastics" p. 147--but for the *proper using* of this material there is no other appliance equally good. A device called the "Thermoscopic Heater"—a steatite plaque—is one which answers the purpose for some, and perhaps would for many, operators, but for those who desire to do the best that can be done in gutta-percha work, the dry heat combined gutta-percha and instrument warmer is an *essential*.

Having thus prepared for the "*proper using*" of G. P. stopping it is only needed now that I should say that the "piece to piece" work of the gold filling of the present day is precisely that of the introduction of a good gutta-percha filling.

The instruments best adapted for the introduction of these fillings are—with the occasional exception of a ball burnisher—*certain forms* of those used for the manipulation of cohesive foil.



It must, however, be noted that those instruments which consolidate foil by "direct impact" are the least useful in packing G. P. stopping, for the principles that govern the value of a gold foil filling are *precisely opposite* to those which govern the value of gutta-percha fillings.

For the perfect introduction of foil it is essential that fair ingress to cavity shall be obtained; for the acceptable introduction of gutta-percha this is not essential. For the former it is frequently necessary to remove large portions of both enamel and dentine; for the latter it is as frequently even more desirable that these tissues be conserved that they may guard against attrition during mastication.

For the integrity of foil fillings, it is better that cavity walls should possess both thickness and strength; for the integrity of gutta-percha fillings it is not important that walls of cavi-

ties should, in much degree, possess either thickness or strength, for some of the greatest triumphs of gutta-percha stoppings have been made in teeth in which excellently made gold fillings had repeatedly failed, until the walls of the now enormous cavities were almost as thin as *letter paper*.

For full directions as to instruments for introducing and finishing G. P. fillings see "Plastics" p. 146, but it seems in place here to say a few words as to the definite manner of making such fillings as given in paragraph 3, p. 146.

"The filling material and instruments (both plugging and finishing) being properly warmed, the gutta-percha should be taken in small pieces—piece by piece—from its plate by means of a moderately fine probe, and thus carried to the cavity and placed in position. If practicable, each piece should be made to adhere to the wall of the cavity, and then be accurately packed into position by the appropriate plunger, until the cavity is either entirely lined, or is partly filled, when the completion of the operation is only a question of a short time; but when this adhesion of the first pieces is difficult, they should be held in position by the probe until they are made to adhere to the walls by the use of a plunger, when that adhesion should, in turn, be maintained by the plunger, while the probe is carefully withdrawn."

It is also a much more important matter than is usually recognized that the utmost accuracy possible in amount of filling material should be regarded, as thus the minimum of surplus—and better none—will remain for removal prior to finishing.

In proportion as a gentle smoothing out of the serrated marks from the pluggers is the only needed finishing, so I have found my gutta-percha fillings most acceptable and most serviceable.

It is, therefore, as pertaining to the properly tested gutta-percha stopping; properly warmed; properly introduced, and placed in properly selected cavities, that I claim it to be the *most permanent* filling material dentistry possesses for such work.

With the *additional experience* of almost twenty years I claim that such fillings will do service *at least three times as*

*ong as well-introduced gold fillings;* and yet, in the criticism in the March "Items of Interest" upon the "Second Edition Revised" of "The American Text Book of Operative Dentistry" it is stated by the Reviewer that it is "the generally accepted belief of the profession that a gold filling properly inserted in a properly prepared cavity is the best known method of ultimately preserving *any tooth.* (Italics mine.)

For myself, in this matter, I think I can justly claim a *vastly greater* experience than can any other observer, and that though in this regard I may be only *one* as against, possibly, more than *twenty thousand!* I yet desire to place myself upon *record*, at this date, as having belief in what I have written, and, furthermore, that my view is *not* an *opinion*, but a conviction based upon more than thirty years of carefully tabulated and observant *clinical experience.*

For teachings regarding other than purely gutta-percha fillings in the teeth of this 4th Dento-Temperamental division—"Positively Bad"—it is unnecessary that they should be other than *grouped*, for with both the bilio-lymphatic and bilio-nervous teeth the peculiar attributes pertaining to the latter are decidedly more pathologic rather than structural.

It is not rapid and recurrent decay that we have to guard against *so much as it is* dentinal, pulp and peri-dental complications as regards sensitivity; *liability* to irritation; inability to resist, and even less to recuperate.

Thus it is that while therapeutic requirements have, in the nervo-lymphatic temperament, reached the culmination of possibility, the "proper choice of filling material" is, practically, one with that as regards the bilio-lymphatic cavities of decay.

It is in these two grades of teeth, therefore, that aside from *all* *gutta-percha* fillings, we most utilize the "Submarines" and even the coin amalgam, and, as well, the "Adjunctives" to filling materials. It is here that plaster of paris; oxy-sulphate of zinc; temporary stopping; oxy-chloride of zinc and the various oxy and nitro-phosphates of zinc are variously and extensively, and, I must say, satisfactorily used, just in proportion to the knowledge of attributes pertaining to each, and to the special manipulative skill of each operator.

That both knowledge of attributes, and manipulative ability are as widely diverse among individual dentists as are any other of the requirements for the best possible practice of dentistry I have also had ample opportunity for learning, for my office was, for many years, an open clinic room, and it was from the teachings of these experiences that I wrote as I did in "Plastics" p. 192, that it was from *want of knowledge* that some of the most miserable plastics had secured "testimonials" as to their excellence; and this *because* "they mixed easily; required no knowledge of attributes; no dexterity; no promptness, neither proper patience; no manipulative ability for their using," requiring nothing but "judgement!"

Now the utilization of any and all "plastics" requires everything except that which complacently poses under the name of "judgment." It requires *knowledge* of all their attributes. It requires, at times, a *dexterity* that is truly seldom attained because it is not known to be a requisite. It requires a manipulative ability in the way of quickness and decision combined, that is to some *impossible* to attain, just as it is *impossible* for some to ever attain the ability to introduce that which by a first-class gold operator would be pronounced "a first-class gold filling."

All this is not "generally" conceded, and, strange as possibly it may be, it seems to be least conceded among some of those who bear the title of "eminent"; but this I cannot but regard as an illustration of "When ignorance is bliss, 'tis folly to be wise"—and there must be some accepted reason for the "bliss," through in my extended practice of dentistry I have never yet learned what it is.

I must say that the most awkward manipulations of plastics I have ever witnessed have been at the hands of some whom I have known as beautiful manipulators of gold; though again, I must say that some fine gold workers have given me the *best* demonstrations of the working of plastics; but, I do not know *one* of these who believes that "a gold filling properly inserted in a properly prepared cavity is the best known method of ultimately preserving *any tooth*."

If any of these did so believe, they would so fill the teeth they fill with plastics; but because they do not so believe is

their reason for filling some teeth with these materials; and it is because they have learned *how to use them* that their results are such as to warrant them in a continuance of that practice.

But more than this, in the by-gone days, when I was in the arena to prove my words by deeds, either in gold or plastic work, I never found *one* who was willing to put his "piece to piece" work against my "soft-foil" work; and still less, his gold work, *in the softest teeth*, as against my plastic work.

The nearest I ever came to this was when Dr. Marshall Webb agreed to fill "gold against plastics" and the *Cosmos* went so far as to have "set up" an editorial comment on the encounter, of which I have the "proof" and which, until quite recently, I thought was published, though it was not, for some reason, thought sufficient, by my friend Dr. J. W. White.

Among the most interesting of the many very interesting *relics* of a long, and certainly unique, practice of, and literary and collegiate association with, "dentistry," I have no other more so, to me, than the letters which passed, and this "proof" of unpublished intentions, as to this "Challenge" and "Acceptance."

The proposed corrected editorial "proof" commenced thus  
"PLASTIC FILLINGS VERSUS GOLD."

"When Greek meets Greek then comes the tug" will now receive a new exemplification, as the challenge of Dr. Flagg, the earnest advocate of plastic fillings, is accepted by the no less earnest advocate of contour fillings, Dr. Webb. We trust that the preliminaries may be speedily and satisfactorily arranged, and that the contest may take place under such conditions that others, beside the contestants, shall reap the benefit of a competitive test of what may, without impropriety, be termed the opposing theories of these two representative operators."

It would seem as though *something* should have come of this, but *nothing* did, for reasons that are fully explained in the valued package of correspondence. But what makes this reminiscence justly a-pro-pos in this connection, is the fact that having selected a patient, as desired to do by Dr. Webb, I showed him a *gutta-percha filling* which had already done

eighteen months' service in that mouth, and told him "I would give him that much excess from the time of trial."

Such *was*, and *is*, my faith in gutta-percha "*properly used*," as is distinctly stated in connection with the statement as to its *permanency*.

It now only remains for me to thank the pages of our **PACIFIC DENTAL GAZETTE** for having afforded me the opportunity and incentive for the writing of that without which I never could have felt that I had done all which evidently had been given me to do, and it is with the hope that this effort may enable *some* to reap from it the giving of such comfort, and such joy, and the receiving of such outpouring of gratitude as has been so heartily given to me during the many years of practice based upon "*The Proper Choice of Filling Material*" as the true means for the almost universal *satisfactory saving of teeth* that I am glad to send it forth as a contribution from a "'49er California Pioneer."









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